



FRONIUS **IG**

PV-Inverter

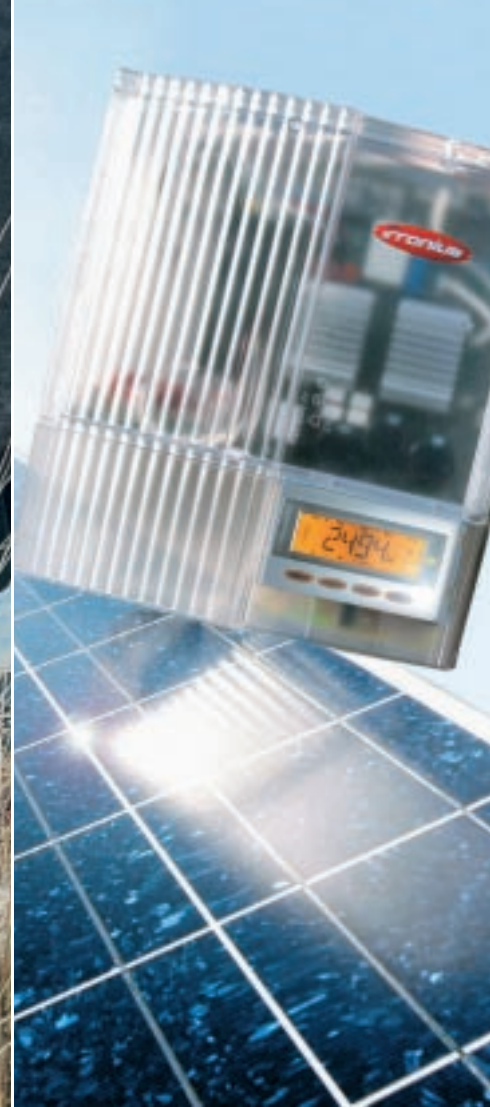


POWERING YOUR FUTURE



IT'S HARD TO MAKE THINGS EASY.

Revolutionising solar electronics. This was the demanding challenge that Fronius set itself and it resulted in a completely new concept for PV inverters. Three central parameters guided the considerations: optimum user-friendliness for the customer linked to the highest possible performance and reliability. These features are the central focus of all Fronius developments. As a result, a family of PV inverters was born that makes it easy for the operators of solar systems to utilise solar power comfortably and at the same time to extract the maximum from every ray of sunshine. Making things easy again is Fronius' vision. It sounds simple, of course, but it was in fact a long, hard road to achieving the target. However, it has paid off - for Fronius and its customers.



CONSCIENTIOUS:

Practical Development.

The design of Fronius's inverters was developed in close collaboration with universities and PV research specialists, and implemented through constant communication with numerous PV system operators. This is the secret of our products: the synthesis of ideas and requests that we get from people using photovoltaics in practice.

Complete customer satisfaction is our secret ingredient. The combination of forward-thinking innovations and practical development makes the FRONIUS IG series into one of the most powerful and user-friendly on the market. It is possible to achieve consistently outstanding energy gains even when using them on sites with low irradiance values.

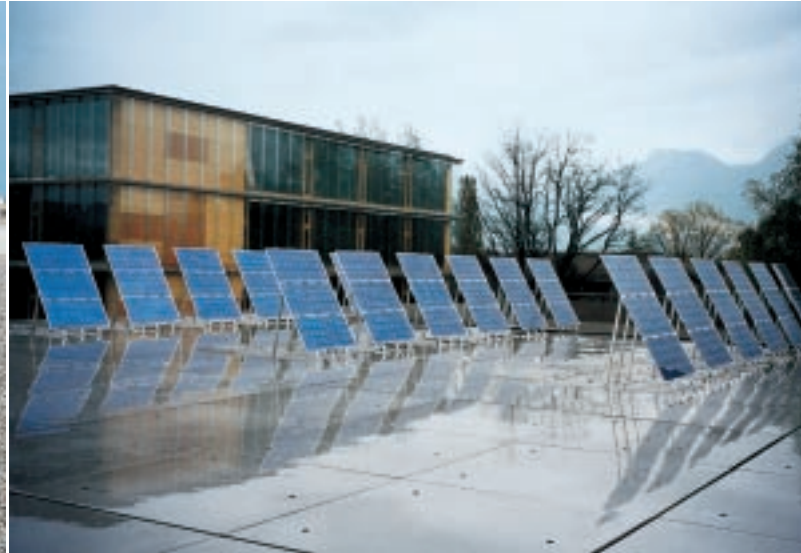
DETERMINED:

The Fronius Company.

For over half a century, Fronius has concentrated on technologies for converting electrical energy.

Its headquarters are situated in the heart of Europe, in Wels, Austria. We now employ over 1,500 people throughout the world. The company is divided into three divisions. In addition to solar technology, Fronius is also a leading innovator in welding technology and battery charging systems.

Research and development is the heart of our company, and also for the Fronius Solar Electronics Division. It is a young, dynamic team that is always on the lookout for new technological approaches and revolutionary developments to turn great ideas into efficient tools.



Photos from left to right: KW-Solar, Mahler, Siblik Elektrik, Stromaufwärts

VARIETY: THE PV INVERTER REVOLUTION.

Well-designed photovoltaic systems are among the safest, cleanest and most environmentally-friendly methods of electric generation. The prerequisite for this is the careful matching of modules and inverters to the desired objective. Fronius has accomplished these requirements and has thus created a PV inverter series that combines the highest levels of both efficiency and user-friendliness. The FRONIUS IG series functions perfectly in both indoor and outdoor applications, and in innumerable system configurations regardless of the system size you select or which applications you prefer.



FRONIUS IG. The Reliable PV Inverter Series.

The FRONIUS IG series has proven itself to be powerful, user-friendly and highly reliable. Equipped for every size of PV system, the combination of different types available for selection is limitless. The ingenious processor control combined with the powerful HF transformer extracts the maximum energy yield from all types of modules.

FRONIUS IG 60. The Powerhouse.

Higher yield due to work-sharing is achieved by linking the two power circuits using the MIX™ concept, our optimised master-slave system. In the part-load range only one of the two power stage sets operates, while both work together at full-load. The advantages are a noticeable increase in yield with a simultaneous reduction in operating hours.

FRONIUS IG Outdoors. The Weatherproof.

The FRONIUS IG Outdoors has been created specially for use in the open air and has been tested to an IP45 degree of protection. This ensures a continuous circulation of air that prevents condensate from collecting. The inverter is also protected against the entrance of solid particles and hose water. It is also reliable and safe to use near the sea due to a special protective coating applied to the printed circuit boards within the inverter.

THE FRONIUS IG SERIES:
Simply Perfect.

No matter how simple the FRONIUS IG series looks today, it has been a complex and challenging road we have travelled to get here. In the development of the PV inverter series, Fronius has rethought the technology, looked for innovative and unique advancements, and found innovative technological developments. The end product is an extremely functional PV inverter that is highly compatible with all solar modules. Operation is intuitively simple and analysis of the system data provides a useful information for nearly any situation. Just the sort of PV inverter that any PV system operator would want!

THE RESULT:
Advanced Technology.



While developing the FRONIUS IG series, we set ourselves ambitious targets and also achieved them:

- Increase in energy yield.
- Clear reduction in weight and volume.
- Informative display for monitoring all system functions.
- Quick and easy installation.
- Modularity in construction to make system expansions as easy as possible (plug & play upgradeability).
- Maximum reliability.

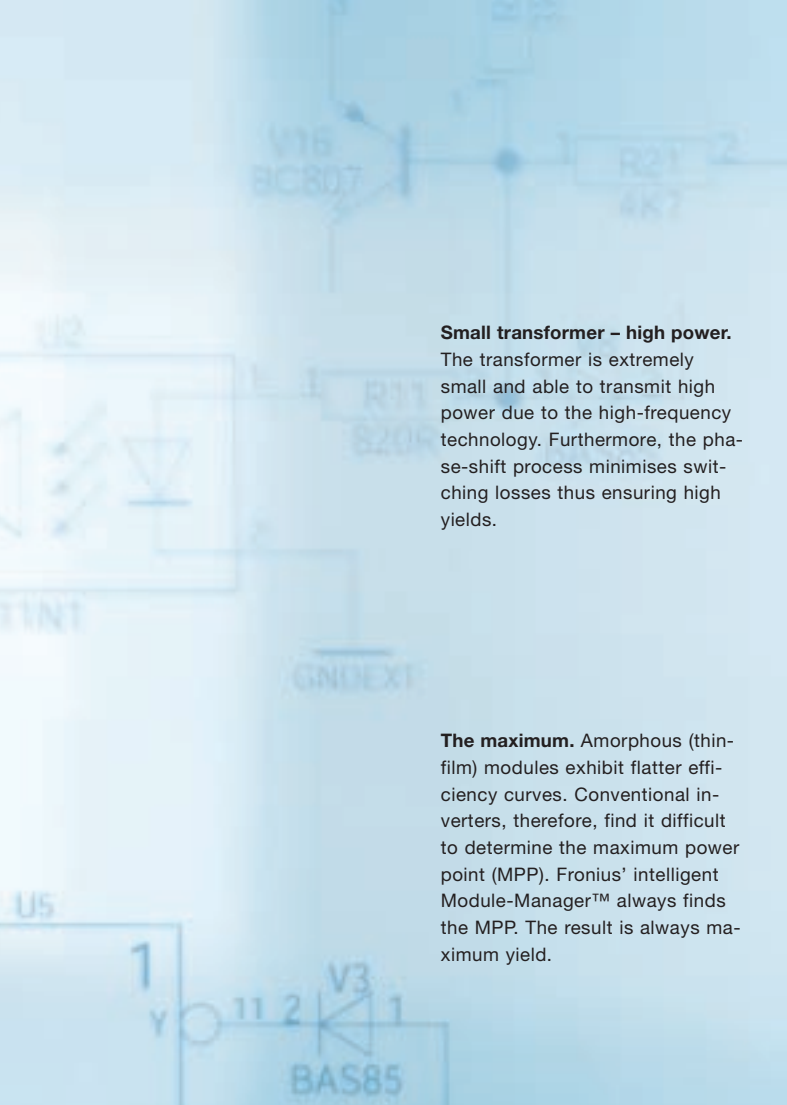
As a result, we have created a PV inverter that works safely with every network in the world and extracts the maximum amount of energy from every ray of sunlight.



INTELLIGENT

FRONIUS **IG**: INVERTERS WITH SPECIAL SKILLS.

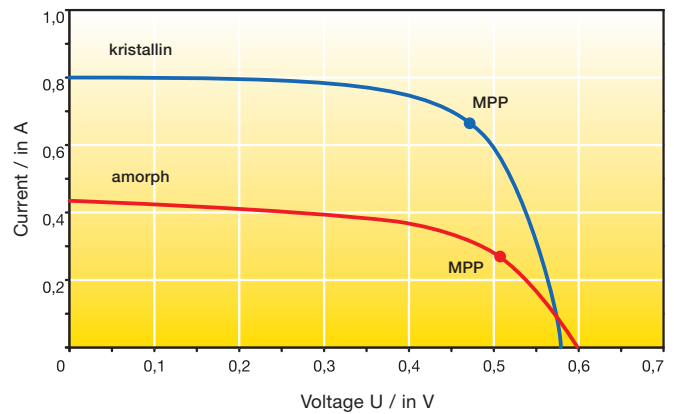
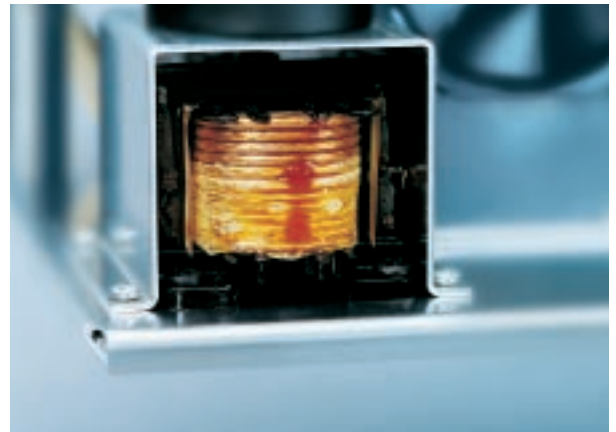
Maximum flexibility with FRONIUS IG. The PV inverter family works brilliantly with all solar panels available on the market. The ingenious processor control – the FRONIUS IG Module-Manager™ – and a large number of other enhancements makes the inverter perfect. FRONIUS IG inverters are made for every size of PV system from 1 KW up to parallel-switched large-scale plants in the megawatt range. They work reliably and efficiently in every class thanks to Fronius' incredible experience and decades of research and development.



Small transformer – high power.

The transformer is extremely small and able to transmit high power due to the high-frequency technology. Furthermore, the phase-shift process minimises switching losses thus ensuring high yields.

The maximum. Amorphous (thin-film) modules exhibit flatter efficiency curves. Conventional inverters, therefore, find it difficult to determine the maximum power point (MPP). Fronius' intelligent Module-Manager™ always finds the MPP. The result is always maximum yield.



HF TRANSFORMER TECHNOLOGY:
Maximum Output in Minimum Space.

The power circuit of all FRONIUS IG inverters is based on the high-frequency concept (HF). The advantages are obvious: it makes the inverter extremely small, light and very powerful, not to mention extremely safe due to its inherent electrical isolation. Combined with the phase-shift process, to reduce switching losses, we have created a powerful device, which stands out by virtue of the best energy yields and maximum flexibility in use. All this with a total weight starting at only 9 kg! Our great experience with HF-Transformers from the welding sector, makes the FRONIUS IG one of the most efficient and reliable PV inverters of all time.

FRONIUS IG MODULE-MANAGER™:
Maximum Output for All Module Types.

The intelligent control of our standard Module-Manager™ control software quickly and efficiently finds the maximum power point (MPP). The software can react accurately to changes in sunlight levels and create the greatest possible energy yield from your array. For this reason, the FRONIUS IG family can always extract the maximum from all module types. This also applies to the thin-film modules that are particularly demanding in this respect. For thin-film modules, the current-voltage curve is very flat. This makes it very difficult for conventional inverters to identify the MPP. By contrast, the Module-Manager™ constantly checks and finds this point, which means that the FRONIUS IG always operates within profitable ranges.



POWERFUL

FRONIUS **IG** 40 AND 60: HIGHER YIELD DUE TO LO- AD-SHARING.

Sometimes it is necessary to make oneself smaller in order to become bigger. This was something Fronius paid attention to in the case of the FRONIUS IG 40/60. Part-load ranges become full-load ranges by using the MIX™ concept, a further development of the master-slave process. This means more energy day after day. The secret lies in the control system. The FRONIUS IG 40/60 conceals two small power circuits in one inverter that work on equal terms. The result is an appreciably higher yield even in unfavourable weather conditions. Through the MIX™ concept, the FRONIUS IG even works with two HF transformers. At the same time, the electrical isolation provides protection and the highest level of safety for both people and buildings.

MIX™ CONCEPT: MORE POWER DUE TO TWO HEARTS.

Increase yield, reduce operating hours.

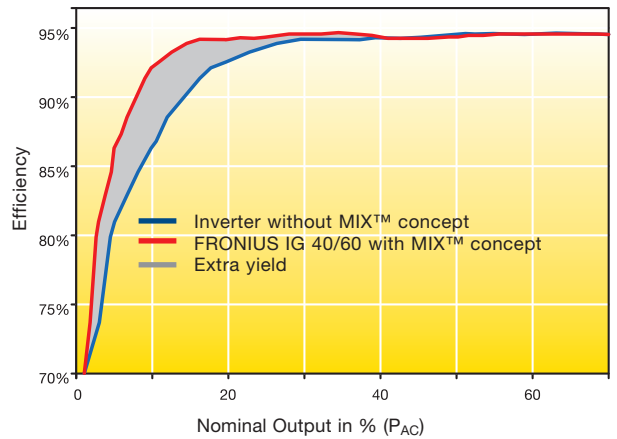
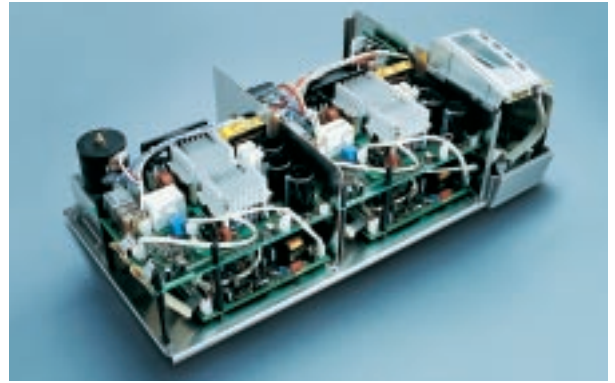
MIX™, the Master Inverter X-Change concept, is a further development of the master-slave process (MS). The MS process was developed in order to obtain higher current yield under part-load. Part-load conditions occur with lower irradiance, such as sunrise or sunset, dusk, heavy cloud, etc. The problem for large power modules is that efficiency drops significantly under part-load.

The solution in the MIX™ concept is that two small power circuits share the work. In part-load the “master” works alone. In full-load the irradiance increases and the “slave” is switched on. However, the MIX™ concept offers even more advantages as the two power circuits are used equally. The intelligent control system alternates the “master” or “slave”

MIX™: two power circuits.

Work-sharing for efficient energy output: these two power circuits alternately assume the role of the "master". This reduces the operating hours by up to 30 %.

Increase in yield. The MIX™ concept turns part-load into full-load. Efficiency rises and thus significantly optimises yields in the part-load range.



function between the two power circuits depending on how long they have each operated. This appreciably reduces the operating hours of both power circuits.

However, this is not all. If one of the two power circuits were to stop working for whatever reason, the other one can continue to work independently. Downtimes or outages are practically a thing of the past. Last but not least, both power circuits are integrated in one unit. So you only have to install a single housing. That saves you complicated and time-consuming wiring and installation. Of course, it is absolutely no problem to interconnect the FRONIUS IG 40/60's for any size of PV system.

FRONIUS IG 40 AND 60:
One Unit – All Advantages.





A GLIMPSE INTO THE WORLD OF THE FUTURE

The FRONIUS IG series has nothing to hide. By pressing a button on the clearly arranged display, you can select whatever parameter you require information about at any one time. A bar on the left-hand side of the graphics display provides a quick overview of the inverter's percentage utilisation. On the right-hand side, next to the figures, symbols and a house show which parameter is being referred to by the value indicated on the display. So the display leaves no questions unanswered.

Now also available as Personal Display, an external wireless display.

INTERACTIVE:

The Informative Display.

Solar energy users like to be constantly up-to-date. This is why the display has been made so uniquely informative and user-friendly. With only a few keystrokes, you can read off the most important data clearly and intelligibly on the intuitively-LED, backlit display screen. The display screen won't leave you in the dark even in the gloomiest cellar. Over 20 different parameters may be called up, e.g. CO₂ reduction, output, energy fed in, yield, as well as ambient/module temperature and irradiance (in conjunction with the Sensor Box/Card). The PV installer can call up additional parameters: min./max. mains and module voltage, mains frequency and impedance. As a result, status signals become meaningful and analysis of the PV system is carried out quickly and reliably. The energy supply has also been well thought-out. The solar system provides an environmentally-acceptable supply direct to the display.

INFORMATIVE



The control and communication centre. The backlit graphics display shows over 20 important system parameters. Operation is extremely easy and self-explanatory.



Up-to-date. The Personal Display, placed in the room of your choice, shows you the parameters of your FRONIUS IG at any time.

UNBOUNDED:

Personal Display: The External Wireless Display

Anyone who would like to be up to date with the output data of his PV system without running to the inverter every time to read the values, can now use the Personal Display. Simply place it in the desired room at home and you can read all the current data from up to 15 inverters at any time. At night the Personal Display shows the collected data from the previous day. The display offers you more comfort and greater user-friendliness.

Installation is easy: insert the Personal Display Card into the FRONIUS IG inverter, attach the antenna on or close to the inverter, place the Personal Display in the house and away you go. No holes and sealing, no costly cabling – just Plug & Play. The radio waves make it possible.



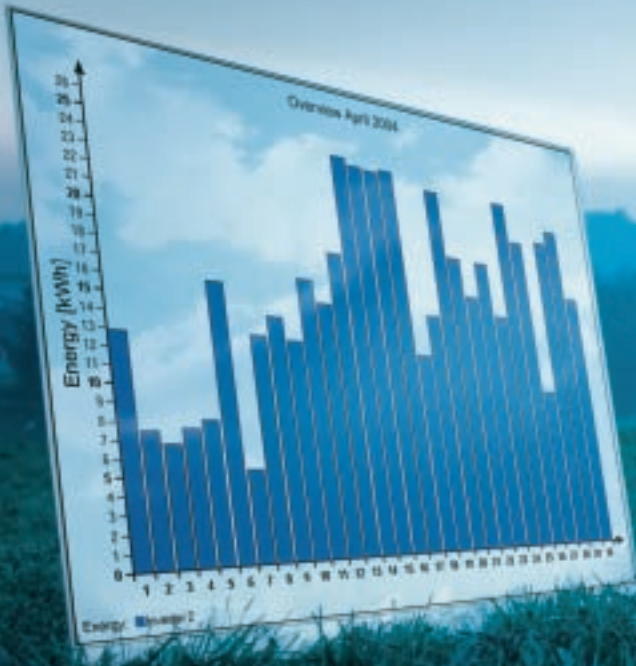
Focus. The display is the intelligent communications interface between PV-system and operator.

Self-diagnosis. The automatic analysis system independently detects any internal or external fault sources and renders them meaningfully on the display.

Optional mains monitoring. Checks the mains for its parameters such as voltage, internal resistance or impedance jumps.

Permanent DC isolation monitoring. With status signal on graphic display.

EXPANDABLE



THE OPTIMUM FOR EVERY PV SYSTEM.

The FRONIUS IG series is perfectly suited to everything from small PV systems to systems in the megawatt range. Planning is easy: the configuration tool – free software from Fronius – knows all the module and system configurations. It calculates the best possible system design in just a few keystrokes. FRONIUS IG DatCom is employed to monitor the PV system and visualise its values. It is an analysis tool that makes every system more efficient and transparent, but best of all allows you to create your own idea of high-performance photovoltaics.

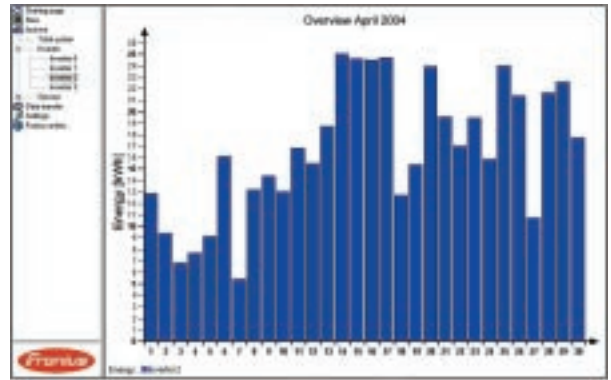
FRONIUS **IG** DATCOM:

Data Analysis and Visualisation.

The FRONIUS IG DatCom expansion modules offer comfortable data acquisition, visualisation and analysis of whole systems. The Datalogger forms the heart, collecting the parameters from PV system networks of up to 100 inverters and 10 sensor cards.

FRONIUS IG.access, the professional analysis software, allows you to visualise the data and thus check the efficiency of your PV system quite simply from your PC. Connection is easy: either by way of a direct interface or remote monitoring using modem. You can also arrange to be alerted via SMS message if a fault occurs.

Fronius also makes it simple to set up a weather station with irradiance, temperature, building load and wind sensors. A large-format display can also be connected for eye-catching visualisation in the public arena based, of course, on the comfortable plug & play principle. So there is nothing to stand in the way of professional energy production.



Clearly arranged. Under the heading “archive/inverter” it is possible to call up various parameters of the inverters, such as the energy returns, in a monthly overview for example.



Big in the open. The FRONIUS IG 60 is also eminently suitable for big PV systems in the megawatt range. Once again the yield is significantly increased by using the MIX™ concept.

EVERYTHING UNDER CONTROL: Large-Scale PV Systems Perfectly Monitored.

The bigger a PV system is, the more important it is that the various system components are accurately monitored, controlled and analysed. A fault would mean a huge loss of energy but even PV systems, with large distances between solar modules and operator, depend on a fully developed monitoring system. The control of all types of systems is in good hands using FRONIUS IG DatCom.

All the values fed in may be monitored comfortably from your PC. Analysis, checking and control of the entire PV system are as efficient as they are comfortable. It is possible to obtain a broad insight into how your system is working whilst comparisons of the most diverse values provide information about the status at any one time. As a result you can react specifically. The system is simplicity itself to install or retrofit.



Flexible. The FRONIUS IG DatCom system can be customised to all customers’ requests due to its modular construction.

Storage. The Datalogger stores the data for up to 3 years.

Flexible connection facilities. FRONIUS IG DatCom expansion components are available either as plug-in cards or external housing.

Safety. The inverter can send you an alarm message by SMS in the event of a fault. So you are always up-to-date.

Professional planning. The Fronius configuration tool – downloadable for free on our home page – is the professional planning tool. Easy to operate, accurate in its output. The database allows you to design your system using any of the modules currently available on the market.

ABUNDANT



Photo: Stromaufwärts

You have now become acquainted with the core members of the FRONIUS IG family. However, there is an infinite abundance of useful details that make the series so uniquely reliable, powerful and user-friendly. Here we present some additional highlights.



Preconfigured. No settings necessary for initial start-up. Just plug & play!

Attractive design. It's not only performance that makes FRONIUS IG so attractive but also the housing that was developed jointly with the University for Industrial Design in Linz.

Ecologically-compatible production. Reduced use of energy-intensive materials, short energy recovery times and recyclable materials used for packaging and housing demonstrate environmental awareness even in manufacturing.

Reliable delivery deadlines. It is possible to deliver even large-scale orders at short notice within guaranteed deadlines due to the introduction of innovative production lines that were inspired by the Japanese car industry.

Tested and certified. The test quota is 100 % of the units delivered. Production is, of course, carried out in line with ISO 9001.

Safe. The highest level of protection is guaranteed due to electrical isolation. Over-voltage limiters provide extra safeguards on the DC and AC input terminals.

Universal. It is possible to use different-size FRONIUS IG power circuits easily and without problem.

Warranty: Five years, extendable to ten years as an option.



OVERVIEW OF THE FRONIUS IG FAMILY.

It goes without saying that every FRONIUS IG complies with all the obligatory guidelines and standards. More in-depth information and certificates may be viewed at www.fronius.com under 'downloads'. Of course, all FRONIUS IG bear the **CE** mark.

INPUT DATA	FRONIUS IG 15	20	30	40	60 HV
MPP voltage range	150 - 400 V	150 - 400 V	150 - 400 V	150 - 400 V	150 - 400 V
Max. input voltage (at 1000 W/m ² ; -10°C)	500 V	500 V	500 V	500 V	530 V
PV system output	1300 - 2000 Wp	1800 - 2700 Wp	2500 - 3600 Wp	3500 - 5500 Wp	4600 - 6700 Wp
Max. input current	10,8 A	14,3 A	19 A	29,4 A	35,8 A

OUTPUT DATA	FRONIUS IG 15	20	30	40	60 HV
Nominal output	1300 W	1800 W	2500 W	3500 W	4600 W
Max. power output	1500 W	2000 W	2650 W	4100 W	5000 W
Max. efficiency	94,2 %	94,3 %	94,3 %	94,3 %	94,3 %
Euro efficiency	91,4 %	92,3 %	92,7 %	93,5 %	93,5 %
Mains voltage / frequency	230 V / 50 Hz (60 Hz)				
Distortion factor	< 3,5 %				
Power factor	1				
Power consumption at night	0 W				

GENERAL DATA	FRONIUS IG 15	20	30	40	60 HV
Size (l x w x h)	366 x 344 x 220 mm (500 x 435 x 225 mm)			610 x 344 x 220 mm (733 x 435 x 225 mm)	
Weight	9 kg (12 kg)			16 kg (20 kg)	
Cooling	controlled forced-air cooling				
Housing variations	designer internal housing; optional outdoor housing				
Ambient temperature range	-20 50 °C				
Permissible humidity	0 95 %				

PROTECTIVE DEVICES	FRONIUS IG 15	20	30	40	60 HV
DC insulation measurement	warning when R _{ISO} < 500k Ohm				
Polarity reversal protection	built-in				
Behaviour on DC overload	displacement of operating point				



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