

PRODUCT GUIDE

UPS systems

PRODUCTION

ENGINEERING

SPECIFICATION

Secure power supply solutions

Tamin Tablo (TTC Wärtsilä JOVYATLAS) designs and manufactures UPS systems for a various wide range of technical applications and with ratings from 625 VA up to 800 kVA per unit or of several MVA as system solution.

Uninterrupted Power Supply Systems (UPS systems) take over general power supply in cases where mains power supply systems fail or are switched off. Secure power supply does not only imply protection in case of power failures, but also guarantees the quality of power. UPS systems protect reliably and their applications are manifold: whether for PCs, home offices, networks / server systems or large production lines in industrial sectors – lack of power quality or even blackouts result in system crashes up to total failures. In many areas like e.g. in hospitals, the safeguard of power supply is vital.



Customised Production

Thanks to the substantial experience in project planning and development customers perceive Tamin Tablo (TTC Wärtsilä JOVYATLAS) as flexible partner for the manufacturing of most diverse and customized systems or even special solutions. Our UPS systems are manufactured to the requirements of our customers. Whether at land or at sea, in the shipbuilding industry, in the field of wind energy on- and offshore, in the area of telecommunication or power supply for hospitals – UPS systems of Tamin Tablo (TTC Wärtsilä JOVYATLAS) provide reliable service worldwide and protect safely from impairments and damage by power failure, sub voltage or surge voltage, frequency changes, harmonics and more. Tamin Tablo (TTC Wärtsilä JOVYATLAS) offers the appropriate UPS solution for any problem.



As a matter of course our company is DIN ISO 9001 and OHSAS 18001 certified.

ALL-WEATHER UPS SYSTEMS

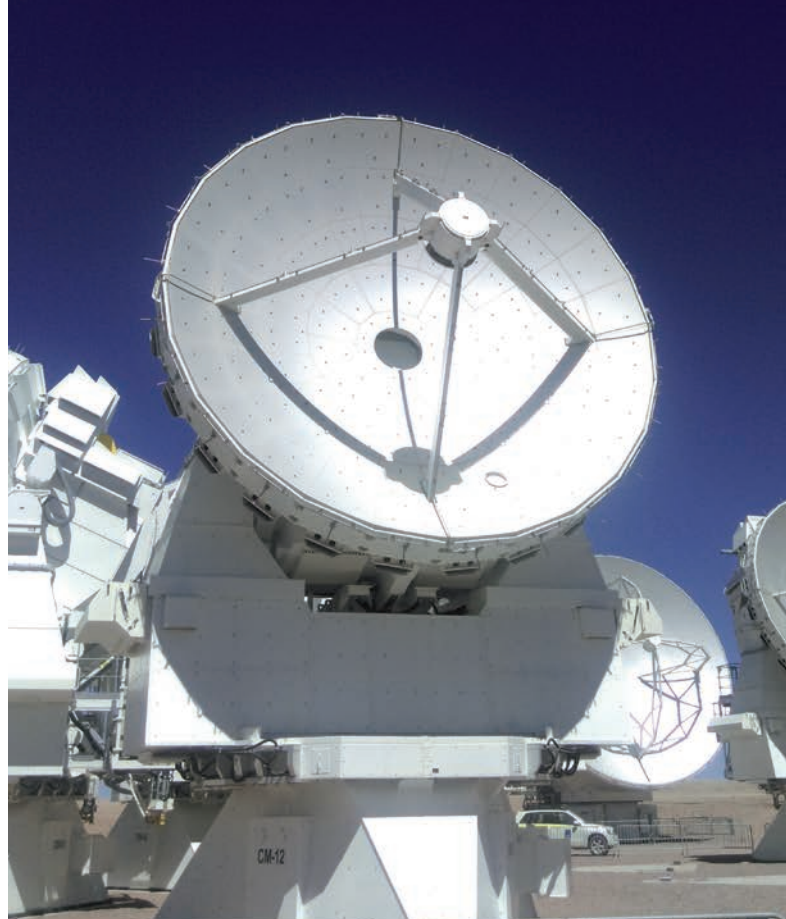
All-weather UPS systems of Tamin Tablo (TTC Wärtsilä JOVYATLAS) work reliably even under extreme conditions, e.g. at temperatures of -30°C up to $+45^{\circ}\text{C}$. Our UPS systems are partial air-conditioned and fitted with NiCad batteries and special input filters, so that efficient functioning of the UPS is guaranteed even at extreme ambient temperatures and difficult grid conditions. All-weather UPS systems are used in wind energy plants or in extreme environmental conditions, e.g. in the antenna project ALMA in the Atacama Desert, Chile. UPS systems of Tamin Tablo (TTC Wärtsilä JOVYATLAS) also protect on numerous offshore platforms the power supply of aviation obstruction lighting systems, of elevators, of tower interior lighting systems, control systems, communication systems etc. All-weather UPS systems of Tamin Tablo (TTC Wärtsilä JOVYATLAS) do not only resist wind and weather, they also adapt to the roughest conditions due to their high vibration and impact resistance and their compact construction. This guarantees reliability and longevity under extreme conditions.

NAVAL UPS SYSTEMS

UPS systems have proven to be indispensable in the naval sector for the supply of critical equipment consumers on board. In case of a power failure of the on-board grid system full capacity of essential systems like emergency lights, radio, navigation, automation as well as communication must be assured for a defined period of time. For the installation of naval UPS systems on an individual vessel we apply and fully comply with the respective valid construction regulations of the classification society. Tamin Tablo (TTC Wärtsilä JOVYATLAS) has become one of the leading manufacturers in the field of naval UPS systems. With more than 70 years of experience in the production of UPS and rectifier systems and complying with classification societies like e.g. DNVGL, Lloyds Register of Shipping, American Bureau of Shipping, Bureau Veritas and R.I.N.A. we are a recognised provider to numerous shipyards worldwide.

UPS SYSTEMS FOR HOSPITALS, LABORATORIES AND HEALTHCARE

In the field of healthcare an uninterrupted power supply is vital. Lifesaving equipment in the intensive care medicine or monitoring systems in the operation theatre area have to be supplied continuously and reliably with power. Battery powered central safety power supply (BSV systems) of Tamin Tablo (TTC Wärtsilä JOVYATLAS) provide their service in numerous hospitals and laboratories worldwide. Systems of these fields of application are manufactured specifically for each order and tailored to the individual requirements. The production of these systems is monitored by our quality assurance system DIN ISO 9001 and complies with the valid standard for medical locations of group 2, DIN VDE 0100-710.



Security and reliability

The original purpose of an UPS system is the backup of power failures. In our times of energy change policy, however, there is a further aspect not to be underestimated: power disturbances in the form of fluctuations, sudden power peaks, harmonic waves etc. Each of those can harm or limit the functionality of sensitive systems such as e.g. computers.

Here damages are observed, which are at first glance not accredited to the power grid, e.g. sudden program crashes during work at PCs (PC freeze/crash). As crashes or limitations in the functionality of systems cause considerable economic damage to companies the acquisition of UPS systems is commonly indispensable. Typical fields of applications are e.g. server systems, IT systems (PCs and workstations), industrial applications (production lines) and control systems.

During a failure or interruption of the power supply the UPS system automatically switches into battery operation mode. During the period of interruption the connected consumers remain supplied with power generated via an inverter from the DC voltage of the batteries. Here, the necessary duration of the backup time is an important criterion for the choice of the UPS system and its batteries. To guarantee the power fail safe function of the UPS system the functionality of the batteries is of vital importance. Therefore, the maintenance of the batteries is as important as the choice of the suitable type of battery.

Generally, there is a distinction between vented and valve regulated lead accumulators: vented batteries are low maintenance batteries (wet batteries with liquid electrolyte). Batteries of this type must be filled up with distilled water from time to time. Valve regulated lead-acid batteries on the other hand are maintenance-free. A distinction is made here between AGM batteries, in which the electrolyte is fixed in a fleece, and gel batteries, in which the electrolyte is fixed by adding silica.

According to battery construction and classification we distinguish between the following types of batteries: AGM batteries, OPzV batteries, OGi batteries, OGIV batteries, GroE batteries and OPzS batteries. Tamin Tablo (TTC Wärtsilä JOVYATLAS) offers batteries of all above-mentioned types. All battery types are subject to a strict quality control.

UPS system with integrated batteries



TTC Wärtsilä JOVYBATT JL



Batteries and battery cabinets

For our UPS systems we use batteries with a lifetime of 5 up to 20 years. In the end customers' requirements determine the choice of batteries. Vented batteries have a long lifetime of 10 to 20 years.

Battery cabinet with drawers



Valve regulated accumulators have a typical lifetime of 6 to 9 respectively 10-12 years. The real lifetime, however, is effected significantly by maintenance and ambient condition. Generally, batteries should not be permanently exposed to a temperature of more than 25°C as the lifetime will decrease considerably.

In order to ensure optimal function of the batteries in use, we recommend regular inspections of the battery status by our qualified staff. For safe operation of UPS systems inspections of the battery system are absolutely necessary. Therefore, battery inspections are included in all our maintenance contracts for UPS systems – our service staff, however, will also carry out separate battery checks irrespectively of their field of application.

Our service technicians have in their service vehicles appropriate load banks at their disposal in order to test batteries independently of their consumers or of the manufacturing process. Hereby defective or weak battery blocks can be detected at an early stage.

For high capacity UPS systems and long backup periods additional battery cabinets are necessary for the storage of batteries. Tamin Tablo (TTC Wärtsilä JOVYATLAS) manufactures various types of battery cabinets suitable for industrial use as well as for the shipping industry, open cast mining or data centres. The battery cabinets are of high mechanical resistance and ensure safe protection against accidental contact, very good accessibility of all monitoring equipment and an easy and fast battery installation (in parts drawer systems). The installation of an air condition in the front or rooftop section enables the use of the battery system also in heated up spaces (production halls) without risking lifetime due to temperature increase.

UPS technology

Suitable UPS systems for various areas of application and requirements – UPS topologies ensure different protection classes. For the selection of suitable UPS systems different parameters need to be taken into account, e.g. the type of equipment to be protected, the required degree of availability and the required backup time and, last but not least, the question of applicability in the respective environment. The most frequent three UPS technologies described below differ in terms of their functionality and their requirements regarding the batteries used.

OFFLINE / STANDBY UPS SYSTEMS

Passive offline standby technology is the most commonly used UPS technology to protect PCs against power failure as well as against sub voltage or surge voltage. The systems of this type of technology are voltage and frequency dependent (VFD). In normal operation UPS systems of this **type** provide the equipment with filtered power without active changes of voltage directly from the power grid. The battery is charged via the main grid. In case of grid failures or disturbances the UPS system provides a stabilized voltage from the battery. The benefits include low costs and the suitability for office environments due to low noise pollution from the equipment. UPS systems of this type of technology are not appropriate for environments with low grid quality (e.g. industrial sites) or with high grid failures.

LINE-INTERACTIVE UPS SYSTEMS







The line-interactive technology is used to protect in-house grid systems and IT sectors against grid failures, sub voltage or surge voltage. UPS systems of this type ensure the quality of the supply voltage and respond to power fluctuations. In such a way the output voltage can be adapted via a booster or a fader mode. The main benefit of this voltage independent (VI) technology is, that sub voltage and harmonic waves can be compensated without affecting the batteries. Line-interactive UPS systems operate at a high degree of efficiency.

ONLINE / DOUBLE CONVERSION UPS SYSTEMS

UPS systems ensuring a permanent voltage protection for mission-critical corporate systems and protecting against all types of voltage problems, require online – double conversion technology. This technology guarantees an on-going protection of power supply independent of grid quality. The systems work independently of voltage and frequency (VFI = Voltage and Frequency Independent) and offer safe protection against sub voltage or surge voltage, frequency noise, harmonics and transient protection. The power supply is completely undisturbed thanks to permanent double conversion (AC/DC, DC/AC) of the output voltage. The double conversion UPS systems are compatible with all types of consumers as no interruptions occur when switching from normal operation to battery operation.

Applications

Overview of possible grid disturbances and their UPS solutions according to the three UPS classification: VFD, VI and VFI.

Grid Disturbances	Time		EN 62040-3 UPS	Solution
Grid fails Voltage fluctuations Voltage peaks	>10 ms < 16ms 4...16 ms	 	VFD Voltage + Frequency Dependent	Passive Standby Operation
Sub voltage Surge voltage	continuous continuous	 	VI Voltage Independent	Line-interaction Operation
Surge protection Effect of lightning Voltage distortions (burst) Voltage harmonics Frequency deviations	< 4 ms sporadic periodical continuous sporadic	 	VFI Voltage +Frequency Independent	Double Conversion Operation (online)

Overview of our UPS systems and their classifications

1-phase input:			
TTC Wärtsilä JOVYLINE	0,625 -2,2 kVA	VFD Technology	
TTC Wärtsilä JOVYTEC P	0,7-3 kVA	VFI Technology	
TTC Wärtsilä JOVYTEC PNT	1 - 3 kVA	VFI Technology	Naval UPS system
TTC Wärtsilä JOVYTEC L	6 - 10 kVA	VFI Technology	
TTC Wärtsilä JOVYTEC PMS	1 - 6 kVA	VFI Technology	
3-phase input:			
TTC Wärtsilä JOVYSTAR PLUS	10 - 20 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR DELTA	40 – 150 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR PRO	60 - 160 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR COMPACT S/M	30 – 160 kVA	VFI Technology	
TTC Wärtsilä JOVYCUBE	20 – 640 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR HP	200 – 800 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR INDUSTRIE	10 – 150 kVA	VFI Technology	
TTC Wärtsilä JOVYSTAR OCEAN	customer-specific	VFI Technology	Naval UPS system
TTC Wärtsilä JOVYMED	customer-specific	UPS systems for hospitals, laboratories and healthcare	

UPS systems



TTC Wärtsilä JOVYLINE

625 VA / 1200 VA / 2200 VA

UPS systems of the type TTC Wärtsilä JOVYLINE are specifically designed for PC workstations. They offer complete protection for private and office PCs. Systems of these series work in the offline mode (VFD) and are an inexpensive alternative to the UPS systems of the JOVYTEC series used in more demanding and complex installations. The UPS systems of the series TTC Wärtsilä JOVYLINE have a USB interface, power input plug and output sockets for the connected equipment. A surge voltage transient protection for modem, network and telephone is also included in the

standard equipment.

Specific software of the computers directly connected to the UPS system allows to display and to record the UPS systems' status and measured value reports. We ensure the exchange of a defective device within 48 hours inside the Federal Republic of Germany for the systems of these series.

Power	625 VA / 1200 VA / 2200 VA
Input	Voltage: 230 V +20% -25% Frequency 50 Hz / 60 Hz
Output	Voltage: 230 V Frequency: 50 Hz / 60 Hz \pm 0,5 % battery operation
Efficiency	92 % - 97 %
Classification	VFD-Y-311 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free (lifetime 10-12 years according to EUROBAT)



TTC Wärtsilä JOVYTEC P

700 VA / 1000 VA / 1500 VA / 2000 VA / 3000 VA

Thanks to the double conversion technology the UPS system of the type TTC Wärtsilä JOVYTEC P meets the requirements of the highest protection class VFI-SS-111. The systems of these series include a diagnostic test system activated each time the UPS system is started and a power related ventilation control unit as well as an active power factor correction unit (PFC unit) guarantying a sinusoidal current consumption. The output voltage of all JOVYTEC P systems also is sinusoidal. The UPS systems of the TTC Wärtsilä JOVYTEC P series provide the connected equipment constantly with a defined

frequency whereby the input frequency can be set between 45 und 65 Hz. A clearly organised and user-friendly operation and display panel allows choosing between four different operating modes: online mode, green mode, free-spin mode and generator mode. The batteries of the systems at the front side of the unit can easily be exchanged: with very little effort the complete battery pack can be replaced during running operation.

Power	700 VA / 1000 VA / 1500 VA / 2000 VA / 3000 VA
Input	Voltage: 230 V Standard; further voltages on request; voltage range (0-100% load): 168 V - 276 V Frequency: 50/60 Hz \pm 3Hz Power factor: 0,98
Output	Voltage: 230 V \pm 2% (208/220/240 V chooseable via panel); further voltages on request Frequency: 50/60 Hz; automatic setting by UPS system
Overload capacity	100 - 125 % for 60 s, 125 - 150 % for 10 s
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYTEC L

6000 VA / 8000 VA / 10000 VA

UPS systems of the series TTC Wärtsilä JOVYTEC L (L=large) cover the power range of 6-10 kVA. Thanks to the online double conversion technology the systems of these series meet the requirements of the highest protection class VFISS-111. They include a diagnostic test system activated each time the UPS system is started and a performance related ventilation control unit as well as an active power factor correction (PFC = Power Factor Correction), guarantying a sinusoidal current consumption. The output voltage of all JOVYTEC L systems also is

sinusoidal. The UPS systems of the TTC Wärtsilä JOVYTEC L series provide the connected equipment constantly with a rigidly defined frequency whereby the input frequency can be set between 45 und 65 Hz. The systems are equipped with a display (LCD) in five selectable languages with large display options for voltage, frequency, battery status and capacity utilisation of the UPS system. A clearly organised, user-friendly operation and display panel allows choosing between four different operating modes.



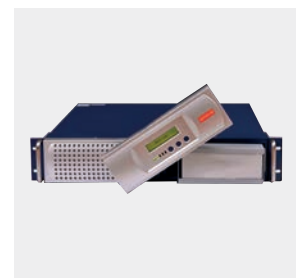
Power	6000 VA / 8000 VA / 10000 VA
Input	Voltage: 230 V Standard, further voltages on request ; voltage range 0-100% load: 168 V - 276 V Frequency: 50/60 Hz \pm 3Hz Power factor: 0,98
Output	Voltage: 230 V \pm 2% or 2 x 115 V at half power Frequency: 50/60 Hz; automatic setting by UPS system
Overload capacity	100-125 % for 60 s, 125-150 % for 10 s
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYTEC PMS

1000 VA / 1500 VA / 2000 VA / 3000 VA

Typical for systems of the TTC Wärtsilä JOVYTEC PMS series is the reliable UPS technology in 19-inch design. The systems have a performance related ventilation control unit and an active power factor correction (PFC = Power Factor Correction), guarantying a sinusoidal current consumption. The output voltage of all JOVYTEC L systems also is sinusoidal. The systems allow choosing between four different operating modes on the operation and display panel: online mode, green mode, free-spin mode and generator mode. The efficiency rate can be increased to more than 98 % in green mode operation. UPS systems of the type PMS1001

with a capacity of 1 kVA have a height of just 44,45 mm (1 HU). This system type is only available with a standard backup time of 4 minutes. The types PMS1002, PMS1502, PMS2002K and PMS3002K are reduced in their depth and meet with their total depth of just 425 mm the requirements of high-end IT control cabinets. The backup time of the types PMS1002 to PMS3002 can be increased by adding further battery inserts (the backup time can be customised according to requirements!)



Power	1000 VA / 1500 VA / 2000 VA / 3000 VA
Input	Voltage: 230 V Standard, further voltages on request; voltage range 0-100% load: 168 V- 276 V Frequency: 50/60 Hz \pm 3Hz Power factor: 0,98
Output	Voltage: 230 V (208/220/240 V chooseable via panel); further voltages on request Frequency: 50/60 Hz; automatic setting by UPS system
Overload capacity	100-125 % for 60 s, 125-150 % for 10 s
Efficiency	AC zu AC 88 - 98 % (depends on operation mode)
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

UPS systems



TTC Wärtsilä JOVYTEC PMS6000

6000 VA

The TTC Wärtsilä JOVYTEC PMS6000 series is extremely flexible in its possible field of application. With its 90° rotatable display the system can be used as a tower or as 19-inch rack; furthermore, the unit is pre-equipped for wall mounting. The display can be removed and positioned at any place outside the system. Thanks to the online double conversion technology the UPS systems of these series meet the

The standard series of TTC Wärtsilä JOVYTEC PMS6000 are designed for backup periods of 9 to 90 minutes at peak load. The UPS systems of these series allow a choice between four operation modes via the operation and display panel: online mode, green mode, free-spin mode and generator mode.

Power	6000 VA
Input	Voltage: 230 V Standard, further voltages on request, voltage range 0-100% load: 168 V - 276 V Frequency: 50/60 Hz \pm 3Hz Power factor: 0,98
Output	Voltage: 230 V (208/220/240 V chooseable via panel); further voltages on request Frequency: 50/60 Hz; automatic setting by UPS system
Overload capacity	100-125 % for 60 s, 125-150 % for 10 s
Efficiency	AC to AC 88 - 98% (depends on operation mode)
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT



TTC Wärtsilä JOVYSTAR PLUS

10 kVA / 15 kVA / 20 kVA

Our UPS systems of the TTC Wärtsilä JOVYSTAR PLUS series are available as single-phase systems as well as three-phase systems up to an output power of 20 kVA. All systems of these series can be operated as online systems according to VFI-SS-111 or in standby mode in order to achieve maximum efficiency. These UPS systems include a PFC rectifier with a very large input voltage range of IGBT technology and a power factor $\cos \varphi$ of almost 1. They are equipped with a self-diagnostic system and have a high dynamic to cope with load variations as well as an extreme low noise level. The rectifier's amount of harmonics (THDI) in nominal operation is below 4%. This low THDI allows a smaller size of emergency power generators than

conventional rectifiers with thyristor technology. All system data are retrievable from a RS 232 – they can also be transmitted optionally via SNMP adapter, MODBUS adapter, PROFIBUS or other bus systems. For short backup periods the battery can be integrated into the UPS housing. For longer backup periods we offer external battery cabinets with individually adapted design. For redundant operation (half load operation, n+1 operation) or power increase parallel connection of up to 6 systems is easily possible.

Power	10 kVA / 15 kVA / 20 kVA
Input	Voltage: Rectifier 3 x 400/230 V +15% -20%; Bypass: 230 V (at 3/1) Frequency: 50/60 Hz \pm 5Hz Power factor: 0,99
Output	Voltage: 230 V (3:1) / 3 x 400/230V (3:3) Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYSTAR DELTA

40 kVA - 150 kVA

The UPS systems of the TTC Wärtsilä JOVYSTAR DELTA series are characterised by low operation costs, excellent efficiency as well as the possibility of remote maintenance. Designed as online UPS system according to VFI-SS-111 this system protects against grid disturbances or failures of any kind. A comfortable monitoring and diagnosis system provides all necessary data concerning the UPS system at any time. For redundant operation (half load operation, n +1 operation) or power increase parallel connection of up to 4 systems is feasible. The UPS system can grow in pace with the demand

of power requirement. The operation panel allows simple handling of all functions. The menu driven program guides the user easily to all display and operating functions of the system. Measured values, alarms and status reports are displayed via easy readable text prompts. The start of the automatic or manual battery test also is menu driven. The modular battery system allows the delivery of all performance ranges up to an autonomy of 3 hours.



Power	40 kVA / 60 kVA / 80 kVA / 100 kVA / 120 kVA / 150 kVA
Input	Voltage: 3 x 400/230V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz ±5%
Output	Voltage: 3 x 400/230V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYSTAR PRO

60 kVA - 160 kVA

Systems of the TTC Wärtsilä JOVYSTAR PRO series are available with power output of 60, 80, 100, 125 und 160 kVA and are used worldwide in both, industry and production. For redundant operation (half load parallel operation, n+1 operation) or for power increase a parallel connection of multiple systems is easily possible.

An almost sinusoidal current input improves the power factor at the input

to conventional UPS systems with thyristor rectifiers TTC Wärtsilä JOVYSTAR PRO systems consume up to 30% less power. The standard series is equipped with AGM technology lead batteries. For larger backup autonomy we offer solutions with OPzS or OGi batteries.

Power	60 kVA / 80 kVA / 100 kVA / 125 kVA / 160 kVA
Input	Voltage: 3 x 400/230V / 3 x 415/240V / 3 x 380/220V ±10% Frequency: 50/60 Hz ±5%
Output	Voltage: 3 x 400/230V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT



TTC Wärtsilä JOVYSTAR COMPACT S/M

30 kVA - 160 kVA

The three-phase UPS systems of the TTC Wärtsilä JOVYSTAR COMPACT series convince by its very high efficiency. These UPS systems include a PFC rectifier with a very large input voltage range of IGBT technology and a power factor $\cos \varphi \approx 1$ (JST COMPACT M). The systems of these series can be operated as both, online systems (double conversion) or in standby / offline mode in order to make use of the efficiency of >98 %. The power factor of almost 1 allows high cost savings in the dimensioning of the supply lines and the potential emergency

power systems. The three types of modes: EHE mode, online mode and filter mode can be chosen manually via the user-friendly display or via the integrated, intelligent control of the UPS system. This integrated control optimises the mode autonomously and ensures the best possible operation of the UPS system.



Power	30 kVA / 40 kVA / 50 kVA / 60 kVA / 80 kVA / 100 kVA / 125 kVA / 160 kVA
Input	Voltage: 3 x 400/230 V Frequency: 50/60 Hz \pm 5Hz Power factor: > 0,99
Output	Voltage: 3 x 380/220V / 3 x 400/230V / 3 x 415/240V Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYCUBE modulares USV-System

20 kVA - 640 kVA

UPS systems of the TTC Wärtsilä JOVYCUBE series are based on a 20 kVA UPS module and offer a flexible solution for power supply from 20 kVA up to 640 kVA. The three types of control cabinets JOVYCUBE 60, JOVYCUBE 160 and JOVYCUBE 200 can each accommodate a different number of modules of 20 kVA; power values of up to 640 kVA can be achieved by combining multiple JOVYCUBE control cabinet systems. The UPS modules convince with efficient power control, dynamic transition without failover times as well as with a high efficiency of 96%. The UPS system can work single-phased as well as three-phased. The AC input and AC output frequency are independent from each other. A

permanent power saving mode ensures optimal efficiency. The TTC Wärtsilä JOVYCUBE modules dispose of an extensive battery management with dynamic load control. Optional available is an external battery monitoring system with separate block measuring, temperature and impedance measuring as well as equalisation charge function for even cell voltage. The communication/information passes via UPS interfaces for parameterisation and system information, via 6 digital inputs and 7 relay outputs.



Power	20 kVA - 640 kVA
Input	Voltage: 3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V Frequency: 45 - 65 Hz
Output	Voltage: 3 x 380/220 V / 3 x 400/230 V / 3 x 415/240 V Frequency: 50 Hz or 60 Hz
Power factor	> 0,99 at 80 % load
Efficiency AC - AC	96% at full load
Efficiency DC - AC	97% at full load
Overload capacity	130% for 15 sec, 4xIn 20 ms (optional)
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

UPS systems

TTC Wärtsilä JOVYSTAR INDUSTRIE

10 kVA - 150 kVA

The various demands and applications in the industry require specific designs of UPS systems and a necessity for customer-specific adaptations or developments of UPS systems. The production of the industrial UPS systems TTC Wärtsilä JOVYSTAR INDUSTRIE series depends on the respective field of application and requirement. The installation of additional outputs or additional DC power supply as well as the type of cabinet, the colour, the position of further installations or more equipment features can be determined by the customer. As a matter of course comprehensive connection options

to computer systems or to a central control station are available for these customised systems. All industrial versions are based on the innovative technology of our TTC Wärtsilä JOVYSTAR series. The UPS systems work within the power range of 10 - 40 kVA with IGBT rectifiers (with PFC); in higher power ranges up to 150 kVA 6-pulse thyristor rectifiers are in use.



Extract of technical data TTC Wärtsilä JOVYSTAR INDUSTRIE ≤ 40 kVA

Power	10 kVA / 15 kVA / 20 kVA / 30 kVA / 40 kVA
Input	Voltage: 3 x 400/230 V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz ± 5Hz Power factor: 0,98
Output	Voltage: 3 x 400/230 V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

Extract of technical data TTC Wärtsilä JOVYSTAR INDUSTRIE ≥ 60 kVA

Power	60 kVA / 80 kVA / 100 kVA / 125 kVA / 150 kVA
Input	Voltage: 3 x 400/230 V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz ±5%
Output	Voltage: 3 x 400/230 V / 3 x 415/240V / 3 x 380/220V Frequency: 50/60 Hz
Classification	VFI-SS-111 gaccording to IEC/DIN/EN 62040-3
Battery	valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT



TTC Wärtsilä JOVYSTAR HP

200 kVA - 800 kVA

UPS systems of the TTC Wärtsilä JOVYSTAR HP series are used in the top range of performance. They provide a power range of 200 up to 800 kVA and offer optimal protection for critical consumers. All TTC Wärtsilä JOVYSTAR HP systems are online UPS systems according to VFI

SS-111. They are equipped with a static bypass, but they are also optionally available with an external manual bypass. Two independent microprocessors provide for a significant safety feature; they control the rectifier, the inverter and the static bypass. For redundant operation (half load parallel operation, n+1 operation) or for power output increase a parallel connection of up to 6 systems is easily possible. Thereby the UPS system can meet increasing power demand. The use of IGBT rectifiers reduces grid repercussion; the power consumption is sinusoidal. The benefits are convincing: due to

the improved rectifier input power factor this UPS system has a reduced power input of up to 30% in comparison with conventional thyristor rectifier UPS systems. The power reduction during grid feed at the rectifier's input enables considerable savings when dimensioning the distribution, fuses and power cables on-site. The excellent power factor of these series and the small proportion of harmonics sustainably prevent an overload on-site of the power system by e.g. generating sets, fuses and switches.

Power	200 kVA / 250 kVA / 300 kVA / 400 kVA / 500 kVA / 600 kVA / 800 kVA
Input	Voltage: 3 x 400/230 V +15 % -20 % Frequency: 50/60 Hz ±5Hz
Output	Voltage: 3 x 380/220 V 3 x 400/230 V 3 x 415/240 V Frequency: 50/60 Hz
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

UPS SYSTEMS FOR HOSPITALS, LABORATORIES AND HEALTHCARE ACCORDING TO DIN VDE 0558-507

5 kVA - 100 kVA

These systems are central battery-backed power supply systems for facilities of medical purposes according to DIN VDE 0100-710 used explicitly to secure power supply within medical facilities such as hospitals, laboratories etc. The manufacturing of these systems is controlled by our quality management system DIN ISO 9001 and meets the valid standard DIN VDE 0100-710 for locations used for medical purposes of group 2. The systems guarantee optimal supply security for system and equipment in the medical sector, such as e.g. in the area of operating rooms, intensive care etc.

The battery powered central safety power supply systems consist of a rectifier, inverter static bypass and a battery system. The inverter converts the DC voltage delivered from the

rectifier or from the battery into a regulated sinusoidal AC voltage. This AC voltage meets all requirements of medical-technical equipment with respect to waveform, voltage and frequency consistency. The rectifiers employed for this purpose ensure a recharge of the batteries within 6 hours. The charging takes place in a battery-saving mode as the rectifiers function according to the IU characteristics DIN 41773. Battery powered central safety power supply systems dispose of very high short-circuit power thus ensuring the triggering of fuses in < 500 ms in case of a short-circuit.

Tamin Tablo (TTC Wärtsilä JOVYATLAS) manufactures customised UPS systems for hospitals, laboratories and healthcare according to the individual requirements.

Power	5 kVA 10 kVA 15 kVA 20 kVA 30 kVA	40 kVA 60 kVA 80 kVA 100 kVA
Input - rectifier	Voltage: 3 x 400/230 V AC ± 10 % , 50 Hz	Voltage: 3 x 400/230 V AC ± 10 % , 50 Hz
Input - bypass	Voltage: 1 x 230 V AC ± 10 %	Voltage: 3 x 400/230 V AC ± 10 % , 50 Hz
Output	Voltage: 1 x 230 VAC ± 10 % , 50 Hz	Voltage: 3 x 400/230 V AC ± 10 % , 50 Hz

UPS systems for marine application



Naval UPS systems

UPS systems have proven to be essential for the supply of critical equipment consumers on-board vessels during the last years. In case of power failure on-board essential systems such as emergency lighting, radio, automation as well as communication must be kept in full capacity for a defined period of time. For the manufacturing of such naval UPS systems the valid construction regulations of the respective classification society are to be respected for the individual

vessel. UPS systems for vessels are manufactured due to customers' requirements and in accordance with the equipment to be supplied to the respective ship.

TTC Wärtsilä JOVYSTAR OCEAN systems are available in the power range of 5-30 kVA (3-phase input/ single-phase output) or 5-200 kVA (3-phase input/ output). Systems of the TTC Wärtsilä JOVYTEC PNT series are suitable for the supply of small consumers and power ranges (<3 kVA).

TTC Wärtsilä JOVYTEC PNT 1000 VA / 1500 VA / 2000 VA / 3000 VA

UPS systems of the type TTC Wärtsilä JOVYTEC PNT are available with a power output of 1000, 1500, 2000 or 3000 VA. The UPS systems of the type TTC Wärtsilä JOVYTEC PNT 1 kVA, 1.5 kVA and 2 kVA have a type examination of the DNVGL and of the Bureau Veritas and meet the following standards: product standard IEC / EN 60945 as well as the IACS Type Test, specification E10. With their online double conversion technology all UPS systems of these series fulfil the requirements of the highest protection class VFI-SS-111. The UPS systems have a diagnosis test system, which is activated at each start of the UPS, a power related ventilation control and an active power factor correction control (PFC = Power Factor Correction) ensuring a sinusoidal current consumption. UPS systems of the TTC Wärtsilä JOVYTEC PNT series supply the connected consumer equipment consistently

with a defined frequency. The input frequency can vary between 45 and 65 Hz. A clearly organised and user-friendly operation and display panel allows choosing between the following operating modes: online mode, green mode, free-spin mode and generator mode. In the online mode according to VFI-SS-111 the consumer is supplied permanently via the inverter. The inverter provides a sinusoidal voltage of highest quality. For the consumers no interruption of supply occurs in case of a grid failure. The batteries of the TTC Wärtsilä JOVYTEC PNT systems can easily be exchanged at the front side of the unit – with very little effort the complete battery cassette can be replaced during running operation.



Power	1000 VA / 1500 VA / 2000 VA / 3000 VA
Input	Voltage: 230 V Standard; further voltages on request, voltage range 0-100% load: 168 V - 276 V Frequency: 50/60 Hz ± 3% Power factor: 0,98
Output	Voltage: 230 V (208 V / 220 V / 240 V chooseable via panel); further voltages on request Frequency: automatic setting by UPS system
Overload capacity	100-125 % for 60s / 125-150 % for 10s
Efficiency	AC to AC 88-98 % (depends on operation mode)
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	Valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

TTC Wärtsilä JOVYSTAR OCEAN

5 kVA - 200 kVA

TTC Wärtsilä JOVYSTAR OCEAN systems are available within a power range of 5-30 kVA with three-phase input and single-phase output or within a power range of 5-200 kVA with three-phase input and output. Larger power output is gladly offered on request. TTC Wärtsilä JOVYSTAR OCEAN systems use the online mode (double conversion technology) according to VFI-SS-111. Here the inverter constantly supplies the connected consumers. This results in highest possible safety for the equipment consumers. The micro-process controlled monitoring of the inverter, rectifier, static bypass as well as the batteries ensure a high security level for the operating of the UPS system. The automatic fault memory guarantees the precise localisation of the failure even at a later date. A

built-in RS 232 interface offers the possibility of remote maintenance or error analysis via satellite or cell phone. The standard RS 485 interface enables a connection to an optionally available remote display. Also optional is the SNMP-capable surveillance software for installation on the PC-network on board. UPS systems for vessels are manufactured due to customers' requirements and in accordance with the equipment to be supplied on the respective ship.



Input voltage/Frequency	according to customers' request /50/60Hz
Output voltage/Frequency	according to customers' request /50/60HZ
Tolerance of output voltage	static +- 1% / dynamic +- 5%
Classification	VFI-SS-111 according to IEC/DIN/EN 62040-3
Battery	valve regulated, maintenance-free, lifetime 10-12 years according to EUROBAT

The technical data of the naval UPS systems TTC Wärtsilä JOVYSTAR OCEAN are customised and can be adapted individually.



Service

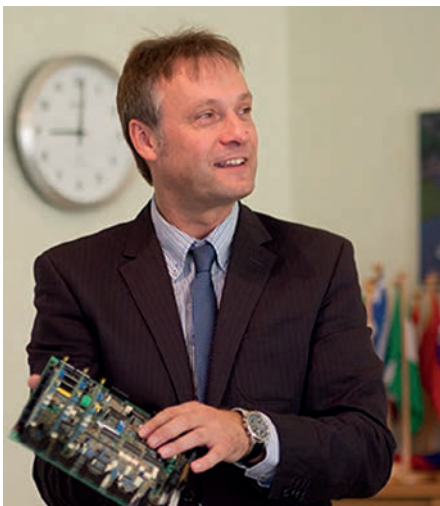
Adequate service completes our broad UPS spectrum.



We put new UPS systems into operation, verify the grid quality and maintain or repair your UPS system during on-site deployment: our qualified service technicians are working for you daily and worldwide.

In case of urgently needed assistance: our 24-hour service guarantees the availability of our service personnel at any time – around the clock, 365 days a year. Professional seminars and training services complete our service offer. Clients or partners receive at TTC Wärtsilä

JOVYATLAS customised and tailored in-house or on-site training on the respective system. The seminars of Tamin Tablo (TTC Wärtsilä JOVYATLAS) are especially designed for representatives, planning departments, end users and installation contractors. Once the training is completed we always will keep you informed about our latest developments.



OUR OFFER FOR YOU:

INDIVIDUAL CONSULTING

With our UPS experts via telephone or on-site.

LOAD ANALYSES

On-site power assessments or load measuring.

UPS EXPERTS

Our sales staff provides you with a perfectly tailored offer customised according to your requirements.

TENDER SPECIFICATIONS IN DIGITAL FORM

Easily available via download on our website.

PROFESSIONAL PROJECT MANAGEMENT

Experienced engineers work out detail solutions jointly with you.

PLAUSIBILITY CHECKS OF YOUR PLANNING IN OUR COMPANY

Our engineers and technicians verify your planning according to legal regulations and quality management systems defined in DIN ISO 9001.

RENTAL EQUIPMENT

For short-term needs UPS systems or resistors are offered for rent.

REPLACEMENT PARTS

Extensive range of replacement parts for all our systems.

SERVICE CENTERS

Our service points ensure fast response times.

UPS accessories

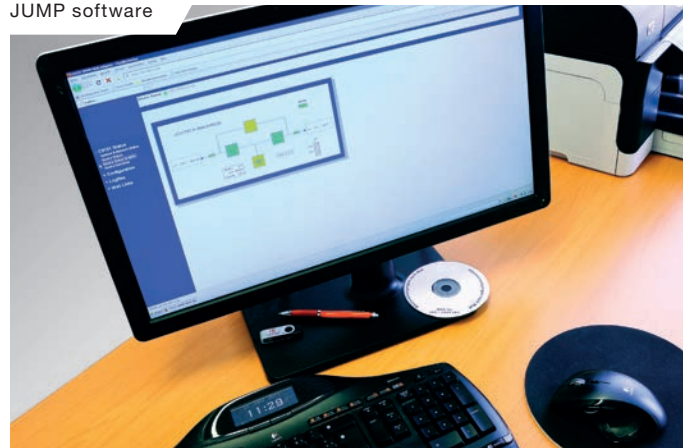
For the UPS systems of Tamin Tablo (TTC Wärtsilä JOVYATLAS) a variety of optional accessories exists. Depending on the requirements joint accessory options are available. Don't hesitate to talk to our technical and sales consultants: we prepare customised solutions for your requests and provide you with detailed information about relay boards, SNMP adapters in their various varieties of constructions, software and their various configurations, licences and fields of application.

UPS SOFTWARE JUMP

The software JUMP (JOVYATLAS UPS Management Program) offers our customers a user-friendly and easy-to-use interface to control and monitor Tamin Tablo (TTC Wärtsilä JOVYATLAS) UPS systems as stand-alone applications. Precondition for the use of JUMP software as monitoring tool is a PC directly linked to the UPS.

The JUMP software enables not only control and monitoring of the UPS, but provides also for a controlled cross-system shutdown of all computers in the network (multiserver shutdown). The software ensures that all users supplied by the UPS are informed about the grid failure and that the operating systems are shut down in an organised way after a defined period of time or shortly prior end-of-discharge of the batteries.

JUMP software



SNMP ADAPTER AND RELAY BOARDS

In case the UPS cannot/should not be linked directly with a PC and a network exists in the vicinity of the UPS system a comprehensive monitoring of the system via SNMP adapter is possible. The SNMP protocol (Simple Network Management Protocol) represents a globally defined standard to control hardware connected to a network and to receive information about the cross-network status of a system. Using a SNMP adapter the UPS system receives an independent IP address via the SNMP protocol allowing any PC via a web browser to select, monitor and control the UPS system.

SNMP adapter



REMOTE DISPLAY FOR VARIOUS UPS SYSTEMS

Many of our UPS systems can be equipped with remote display / remote control.

Remote control



RACK RAILS

Some of our UPS types are suitable for installation in a 19" housing. Adjustable rails serve as professional mounting connections between UPS and a cabinet. The use of rack rails considerably facilitates maintenance.

SENSOR MANAGER

The sensor manager collects various measured values. In principle, it is an interface gathering and recording information of different sensors. In this way, e.g. air temperature, humidity, output voltage of the UPS system or charging status of the batteries can be read centrally on a monitor screen.

TEMPERATURE METER

For temperature compensation and optimisation of the battery charging voltage.

EXTERNAL BYPASS

The external bypass connects consumers to the UPS or directly to the grid without interrupting the power supply for the consumer. Just with a simple switch the power grid supplies the consumer and the UPS is kept free from live currents and can be removed from the configuration, e.g. for the purpose of maintenance.

POWER DISTRIBUTION UNIT

A power distribution unit distributes the power– similar to a multiple socket – to the consumers. Intelligent versions allow e.g. to switch individual consumers on and off in a defined way.

Rack rails



Sensor manager



External bypass



Tamin Tablo TTC Wäartsilä JOVYATLAS guides you during the entire product cycle.

From the idea to the manufactured product: we provide you with the individual solution for your needs, from the individual power supply components to the overall concept as off-the-shelf or customised

The reliable quality of our components guarantees safe use during the entire product life cycle. In case upgrades or modifications are necessary or replacement parts are needed, we are happy to assist you with our knowledge and this for decades to come.

**FROM THE IDEA TO
THE PRODUCT –
WE GUIDE YOU!**



Tamin Tablo Industrial Group was established in 1976, with more than 40 years of experience in the field of manufacturing electrical panels. TTC based its activities on designing and manufacturing of low voltage, medium fixed and withdrawable, control panels, marshall posts and power factor panels.

TTC Wäartsilä is a global leader in advanced technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation and total efficiency, TTC Wäartsilä maximises the environmental and economic performance of the vessels, power plants and LNG infrastructure of its customers. In 2015, TTC Wäartsilä's net sales totalled EUR 5 billion with approximately 18,800 employees. The company has operations in over 200 locations in more than 70 countries around the world. TTC

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