

# TTC Wärtsilä JOVYREC HC16CH

## PRODUCT LEAFLET



Charge/discharge rectifiers of the type TTC Wärtsilä JOVYREC HC16CH were developed for conventional, diesel-driven submarines. The microprocessor-controlled charge / discharge rectifier can be deployed to charge or discharge submarine traction batteries fully automatic and gently up to 950 VDC with current up to 3000 A. During charging process these systems function as load rectifiers, during discharging of the battery as line-commutated inverter. During discharge the discharged energy is fed economically back into the grid – this saves energy costs and protects our environment.

### DIFFERENT DESIGNS

Systems of the type TTC Wärtsilä JOVYREC HC16CH are available in three different designs: the control cabinet version is designed for installation in electrical operating rooms within permanent buildings. For mobile application and medium power performance a weather-resistant trailer is available, in which the converter is mounted. For more power performance and mobile application mounting in standard steel container is feasible, optionally also available with undercarriages. The container can be equipped with storage devices for cable, charging plugs and distillation units. The additional installation of a single-cell treatment unit, the TTC Wärtsilä JOVYREC HC16 ACT, is feasible too.

### SAFETY AND RELIABILITY

Significant feature of the charge / discharge rectifiers is a fully controlled thyristor bridge with B12C circuit. The switching from charge to discharge mode or vice versa is effected by means of contactors. The charge or discharge data are selectable in steps. In case that grid failure occurs during feeding back into the grid a special DC high-speed switch ensures necessary short-circuit protection.

### AUTOMATION DUE TO PROGRAMMING OF CHARGE / DISCHARGE CHARACTERISTICS

The systems are programmable therefore the charging processes of submarine batteries can be automated. The very low residual ripple of the DC voltage and high control precision allow gentle and reactivating charging. Furthermore, the systems can be deployed as constant electrical load in order to discharge batteries. With the respective

characteristics up to 96 hours charge / discharge time are programmable.

### CUSTOMISED MANUFACTURING

Products of the TTC Wärtsilä JOVYREC HC16CH series are designed for customer-specific applications. Wärtsilä JOVYATLAS already has implemented numerous charging stations according to most various clients' requests and has well-known customer references in submarine ports worldwide. For the following submarine types Wärtsilä JOVYATLAS delivers charging systems: U205 / U206 / U209 / U212 / U214 / Kilo Class / Dolphin Class and Scorpene submarines. Our engineers develop a clearly structured design concept for each specific application. As a rule we also deliver components for the installation of the infrastructure, e.g. switchover devices and junction boxes. Gladly we assist as competent partner already in the planning phase.

### COMFORTABLE OPERATION

The operating and display panel consists of a LCD monitor, a keyboard necessary for the operating, a transducer, warning and error messages as well as additional light-emitting diodes for fundamental operating states of the system. Via the operating panel the respective necessary charge profiles / discharge profiles can be pre-programmed and launched.

**TECHNICAL DATA**

Power up to 2 MW (acc. to type of submarine)

**INPUT:**

Voltage 400 V AC / 440 V AC / 660 V AC / 11 kV / 22 kV

Phases three-phase

Frequency 50 / 60 Hz  $\pm$  5 %

Efficiency ca. 0,90 ind. at charging and full load  
approx. 0,7 up to 0,8 cap. at discharging and circuit feedback 8%

**OUTPUT:**

Voltage 30 - 620 V (up to 950 V optional available)

Current max. 3000 A (programmable)

Tolerance of voltage  $\pm$ 1% static

Efficiency 94% at full load

Ripple max. 2 % effective while battery is connected

Charging characteristic Ia, IUa, IUUa -cycles acc. to DIN 41773 free programmable

Discharging characteristic Ia, Pa, constant

Temperature regulation per cell 5 mV/°C

**SETTINGS:**

Temperature 0°C up to +40°C  
-10°C up to +50°C for container or mobile trailer

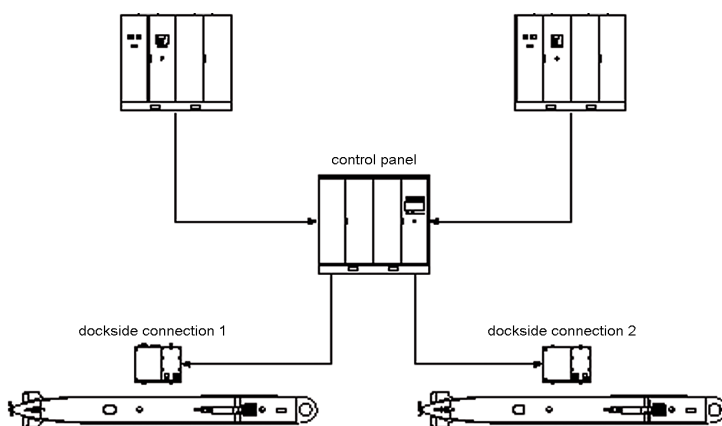
Humidity < 95 %, no condensation

Protection class IP 20 resp. IP 54 for container or mobile trailer

Mode of operation permanent operation

**COMMUNICATION:**

All system data can be read out via RS 232/USB-interface.  
Signal informations are given via relay card.



— **CHARGING / DISCHARGING OF SUBMARINE BATTERIES**  
for different submarine classes

— **ALSO FOR LARGE PERFORMANCE RANGES**  
numerous projects of 2 MW are already realised

— **PROGRAMMABLE CHARGE / DISCHARGE CURVES**

— **POWER REGENERATION**  
saves energy and preserves resources.

— **REMOTE CONTROL FEASIBLE**

— **COMFORTABLE OPERATION**

— **CUSTOMISED MANUFACTURING**

Fig.1 Wärtsilä JOVYREC HC16CH

