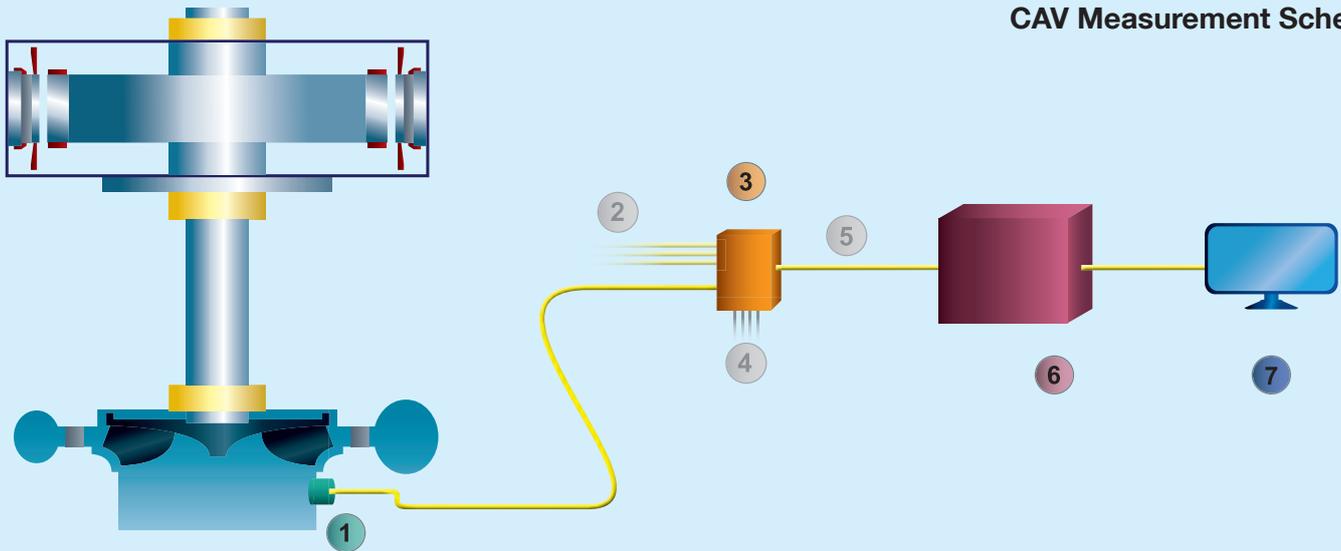


DIA TECH CAV

Cavitation monitoring module

CAV Measurement Scheme



- | | | | | | | |
|---|---|--|----------------------|-----|---------------------|-------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Cavitation sensor mounted at turbine's draft tube | Cavitation intensity signals from other units | SCADA (Supervisory Control and Data Acquisition) | Auxiliary Parameters | LAN | Monitoring Computer | Grafical User Interface |

DIA TECH CAV provides the possibility to assess deterioration of the turbine condition caused by cavitation. A proper software package processes the measured signals of cavitation intensity and delivers a number of informative results such as operating hours in dedicated cavitation levels (or zones), accumulated cavitation intensity and cavitation intensity in relation to selectable machine parameters. Special graphic features enable to display the various results.

Acquisition of measured values

DIA TECH CAV uses special vibration sensors for cavitation measurement. The sensors are to fit at selected points on the turbine's casing (draft tube or runner cham-

ber). The strong pressure pulses caused by imploding cavitation bubbles are propagated in the form of hydraulic pressure waves. These waves will be measured in the frequency range around 20 kHz. The vibration sensors take up the acceleration signal and process it into a cavitation intensity signal with 4 to 20 mA output, which is ready to be transmitted to the data management package DIA TECH CORE via any SCADA system (e.g. ANDRITZ Datalogger).

Processing of measured values

The intensity of cavitation is represented by the **Stress Energy Level** value (SEL). Its time integral is computed as a measure of cumulative cavitation effect. The smart assessment of cavitation effects is supported

by selected parameters, such as flow rate, net head, power or others, which are taken over from the control system or from any datalogger.

All measured and calculated data such as cavitation intensity, cumulated cavitation intensity and related turbine operating hours in selected ranges and related parameters are stored in the common database for long-term archive, and visualized in the smart trend chart of the graphical user interface DIA TECH GUI.

An other useful function is the continuous indication of the actual operating point of the turbine within the hill chart.

DIA TECH CAV

Cavitation monitoring module

Acquisition requirements:

Required hardware:

Cavitation sensor – HI 5703 (5...60kHz) with integrated analogue value processing unit (output 4...20mA)

Auxiliary parameters for diagnosis

Free selectable parameters (e.g. flow rate, net head, active power)

Main specification:

Number of measuring-points:

One (1) software package is able to process 1024 cavitation signals.

Limit monitoring (pre-warning, warning) upon
Cavitation intensity

Pre-processing at front-end Datalogger:

Cavitation intensity – Measuring of high frequency (5 to 60 kHz), conversion into 4 to 20 mA output signal, Output = Stress Energy Level (SEL)

Additional diagram:

Online display of turbine's operating point (flow rate versus net head) within the turbine hill chart

Processing at computer:

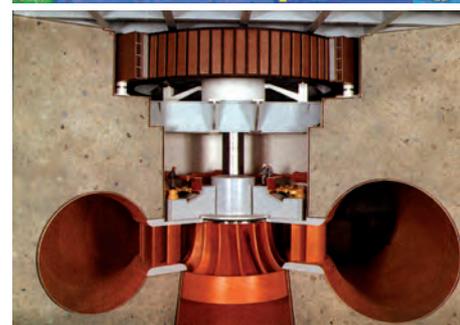
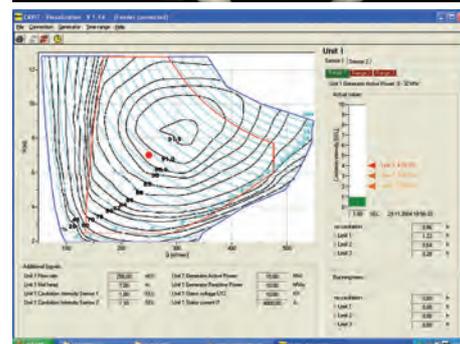
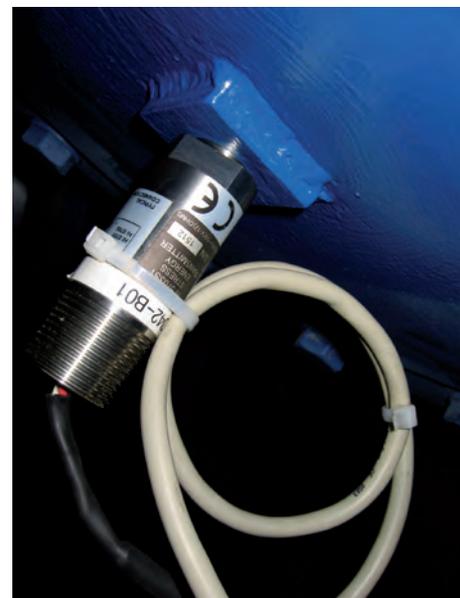
- Duration of cavitation
- Counting of operating hours within various selectable cavitation zones as well as selectable time periods

System requirements:

DIA TECH CAV requires the data management software package DIA TECH CORE. All DIA TECH Modules are running on standard personal computers and a Windows®-based platform.

Available DIA TECH Knowledge Modules:

- DIA TECH CAA-HS (Cooling air analysis – hotspot detection)
- DIA TECH CAA-O3 (Cooling air analysis – ozone diagnosis for surface partial discharge)
- DIA TECH CAV (Cavitation monitoring)
- DIA TECH IRD (Rotor pole temperature module based on infrared measurement)
- DIA TECH MFX (Magnetic flux monitoring)
- DIA TECH MGM (Machine gap monitoring module for air gap and turbine clearance)
- DIA TECH RTMP (Rotor winding temperature module based on calculation)
- DIA TECH SBS (Structure borne sound diagnosis for stator core vibration)
- DIA TECH ThM (Thermal diagnosis for stator core & winding and cooling circuit)
- DIA TECH CORE (Data management package with graphical user interface)
- DIA TECH TPOT (Turbine / pump operation time counter)



DIA TECH is part of NEPTUN, the integrated common solution for secondary technology.