

## TCM<sup>®</sup> MONITORING SERVICES

### TCM<sup>®</sup> Monitoring

TCM<sup>®</sup> Monitoring is a service for turbine owners with TCM<sup>®</sup> installed. The TCM<sup>®</sup> Monitoring service has an open communication with the end-users and optimizes the daily work for O&M operators, as our customers have full access to their turbine data: health indicators, measurements, reports, and more.

The Service is provided in 3 different levels depending on your requirements; Basic, PRO and PRO+. For further information about the three service levels please see the product description about TCM<sup>®</sup> Monitoring Service Levels.

### Customer Portal

At the heart of our TCM<sup>®</sup> Monitoring Service lies our Enterprise Server which feeds our online TCM<sup>®</sup> Customer Portal with concise and condensed information. Through the online and user-friendly Customer Portal our monitoring clients are able to login and obtain information on turbine conditions based on analysis and expert assessments according to the chosen TCM<sup>®</sup> Monitoring Service Level. This could include events and status summaries, major component health indicators, and lists of recommended actions i.e. "Inspect high speed shaft on Turbine 2"

### Features

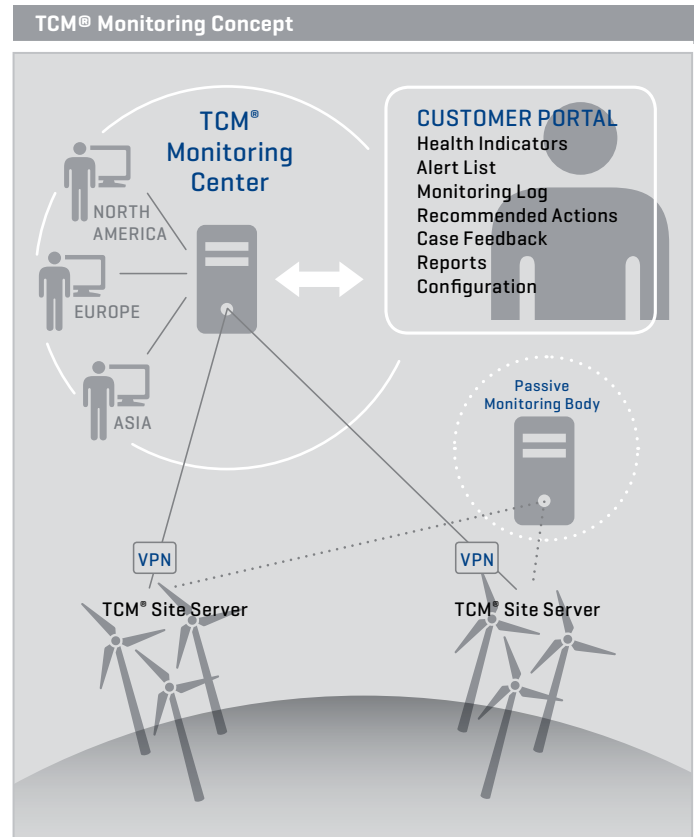
- Online Customer Portal for instant access to turbine information
- Cost-effective alternative to in-house monitoring
- 24/7 remote monitoring
- Online ticket system for customer support
- E-mail alerts
- Reporting

### TCM<sup>®</sup> Monitoring service levels

At Gram & Juhl we understand that every customer is different and no two companies are the same - that is why we offer 3 different condition monitoring service levels.

### TCM<sup>®</sup> Monitoring Basic

TCM<sup>®</sup> Monitoring Basic is a service for utilities, turbine owners, and service providers. The TCM<sup>®</sup> systems in the wind turbine operates 24/7 and is monitored by the TCM<sup>®</sup> Monitoring team in working hours, which will notify customers via email when necessary. The Basic service level also includes access to the Customer Portal. The service includes security and software updates for the TCM<sup>®</sup> installation.



### TCM<sup>®</sup> Monitoring PRO

TCM<sup>®</sup> Monitoring PRO gives access to the TCM<sup>®</sup> Customer Portal, which is the heart of the TCM<sup>®</sup> Monitoring PRO levels. You have unrestricted access to Historical Health indicators, log and event information through the user-friendly Customer Portal giving you a concise overview of the condition of your turbines.

### TCM<sup>®</sup> Monitoring PRO+

TCM<sup>®</sup> Monitoring PRO+ adds a number of features to the PRO level such as assessment reports, recommended actions and events.

For more information about the different service levels please see the "Monitoring Service Levels" PD or contact Gram & Juhl's sales department.

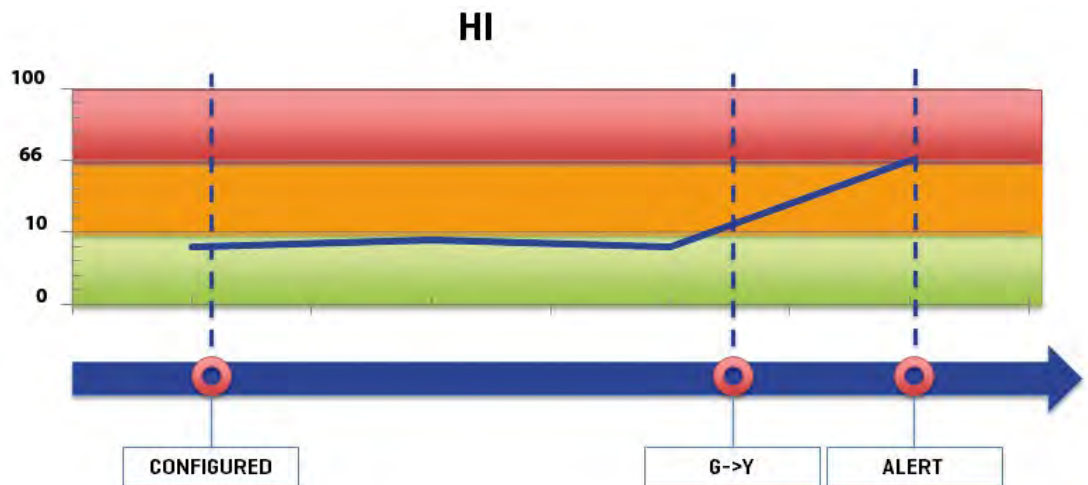
## TCM<sup>®</sup> MONITORING SERVICES

Service Components	
Feature	Description
Measurement configuration	Once your sites are activated for monitoring via the TCM <sup>®</sup> Customer Portal, your existing measurement configurations for each TCM <sup>®</sup> Site Server will be retrieved.
Machine model	Your machine models based on the kinematics of each turbine type you have in your monitoring portfolio will be uploaded for view in the TCM <sup>®</sup> Customer Portal after monitoring has been activated for each site.
Support	Available via an online ticket system.
E-mail alert	Configurable in TCM <sup>®</sup> Customer Portal

Customer Portal	
Feature	Description
Action log	List of monitoring actions taken
Health indicators	Based on condition indicators and shown as a historical trend. For PRO and PRO+ [See Fig. 1 below.]
Timeline	Chronological timeline of events aligned with turbine health indicators. For PRO and PRO+ [See Fig. 1 below.]
Recommended actions	Instructions for turbine responsible personnel, such as "Go and inspect", "Repair", "Replace", etc.
Reports	Online or via download [i.e. pdf] TCM <sup>®</sup> interactive report to be viewed in Ocular
Additional logins	Multiple logins provided for administrators, site-based personnel, etc.

**Health Indicators (HI)**

HI is a number expressing the health condition of a component. Low [green] signals low probability for failure while a high number [red] indicates an impending severe failure is detected.



TCM <sup>®</sup> Monitoring Service	
Order number	TCM <sup>®</sup> Monitoring Service Level
9000-0003-0006	TCM <sup>®</sup> Monitoring Basic
9000-0003-0003	TCM <sup>®</sup> Monitoring PRO
9000-0003-0000	TCM <sup>®</sup> Monitoring PRO+