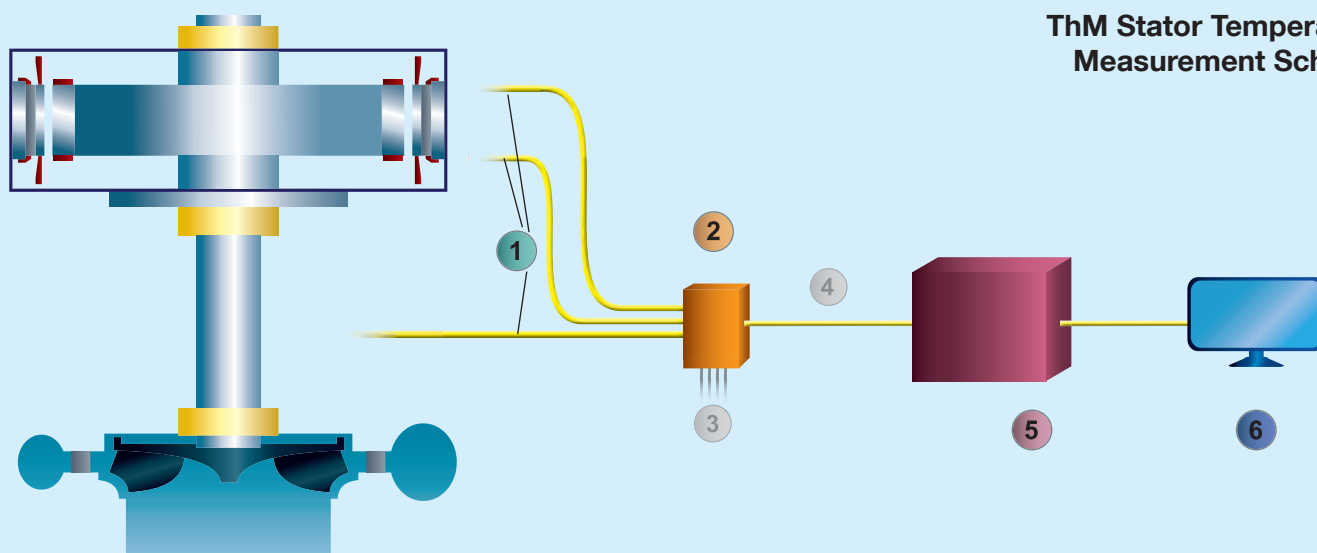


# DIA TECH ThM

## Thermal diagnostic Module

ThM Stator Temperature Measurement Scheme



1

Existing sensors:  
Stator winding temperatures  
Stator core temperatures  
Cooling air temperatures  
Cooling water temperatures

2

SCADA  
(Supervisory  
Control and  
Data  
Acquisition)

3

Auxiliary  
Parameters

4

LAN

5

Monitoring  
Computer

6

Grafical User  
Interface

**DIA TECH ThM provides thermal diagnosis for the stator core and stator winding of the generator** based on the installed core and slot temperature sensors. Temperature rises are evaluated in correlation to the load condition with the help of mathematic algorithms. The hotspot detection is limited to the local area around the temperature sensors.

If more than three probes are available in the core or in the slot areas a plausibility check will be executed. It works by cross-checking of comparable adjacent values. Thermal diagnosis for the generator cooling circuit based on the installed air-and water

temperature sensors. The heat exchange capability of the air-water-cooling system is evaluated based on a rule-based model. Therefore it is possible to detect condition changes due to leakage or clogging within the cooling systems.

### Acquisition of measured values

All required values are generally available in power plants. The DIA TECH System usually obtains these measured values from the existing automation, instrumentation or control system. The data transfer runs on standardised interfaces based on Ethernet connection under TCP/IP as well as on serial connection.

### Processing of measured values

The DIA TECH ThM module obtains the temperature signals and stator current (as important load information) from the data management package DIA TECH CORE, processes them and sends back calculated values, such as temperature gradient, standard deviation and heat transfer factor for coolers. The DIA TECH CORE system is responsible for long-term storage in data base and smart trend visualisation in the graphical user interface (DIA TECH GUI). In case DIA TECH ThM has detected any problem, it generates a smart text message, which is displayed in the message window of the DIA TECH GUI.

# DIA TECH ThM

## Thermal diagnostic Module

### Examples of diagnosis messages

Generator [n] warning:

- cold water temperature sensor [x] deviates excessively from average – problem in stator or cooler (y)
- cooler number [x] has lost cooling capability – the machine may be getting dirty (y)

### Message examples by plausibility check

Generator [n] warning:

- slot temperature sensor [x] deviates excessively from average – defect sensor (y)
- cold air temperature sensor [x] deviates excessively from average – defect sensor (y)

### Acquisition requirements:

#### Required hardware:

Data acquisition components – SCADA, control system or any PLC

#### Auxiliary parameters for diagnosis

Stator current

### Main specification:

#### Number of measuring-points:

One (1) software package is able to process about 6 x120 temperature signals.

#### Processing at computer:

- Temperature rise (from slots and core)
- Temperature gradient (from slots and core)
- Standard deviation from average temperatures (from slots and core)
- Heat transfer factor for coolers

#### Limit monitoring

(pre-warning, warning) upon

- Temperature rise dependent from stator current
- Standard deviation from average temperatures
- Heat transfer factor for coolers

#### System requirements:

DIA TECH ThM 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)

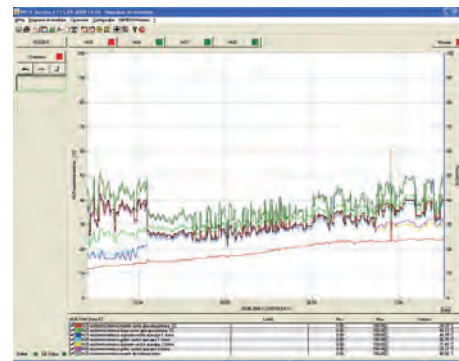
DIA TECH RTMP (Rotor winding temperature module based on calculation)

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.**

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