GE GE □□□ Series Service Manual

IS200VTURH1BAA

1. Description

SPECIFICATIONS

2. Specifications

Specification	Value
Manufacturer	**General Electric**
Series	**Mark VI Speedtronic**
Functional	**Part Number IS200VTURH1BAA**
Functional	**Description Primary Turbine Protection Card**
Revision	**Total 3 Revisions**
Backwards-Compatibility	**1st two revisions**
Assembly	**Type Normal Assembly**

3. Product Information

SPECIFICATIONS

Part No.: IS200VTURH1BAA

Manufacturer: General Electric

Country of Manufacture: United States of America (USA)

Temperature rating: 0 to 60 oC

Flame detectors: 8 per VTUR

MPU pulse rate range: 2 Hz to 20 kHz

MPU pulse rate accuracy: 0.05 percent of reading

MPU input circuit sensitivity: 27 mV pk (detects 2 rpm speed)

Product Type: Turbine Specific Primary Trip Board

Availability: In Stock

Series: Mark VI

Functional Description

IS200VTURH1BAA is a turbine specific primary trip board developed by GE. It is a part of Mark VI control system. The turbine control board VTUR plays a pivotal role in overseeing various critical functions within the turbine system, each aimed at ensuring safe and efficient operation. Its multifaceted functions encompass a range of monitoring, controlling, and safeguarding measures that contribute to the overall integrity and functionality of the turbine system. VTUR serves as a pivotal control hub within the turbine system, orchestrating various safety, monitoring, and control functions to maintain operational integrity, safety, and efficiency. Its comprehensive functionality underscores its critical role in safeguarding turbine operations while ensuring seamless functionality across various subsystems.

Features

Turbine Speed Measurement and Overspeed Protection: VTUR efficiently measures turbine speed using four passive pulse rate devices. This measured data is relayed to the controller, which generates the primary overspeed trip signal. This safety mechanism acts as a crucial protective measure against potential overspeed conditions.

Automatic Generator Synchronization and Breaker Control: In addition to overspeed protection, VTUR facilitates automatic generator synchronization, ensuring seamless coordination between generator systems. It also manages the closure of the main breaker, enhancing the system's efficiency during operation.

Monitoring of Induced Shaft Voltage and Current: VTUR meticulously monitors induced shaft voltage and current, crucial parameters that provide insights into the operating conditions of the turbine. This monitoring aids in identifying and addressing potential issues to maintain optimal performance.

Geiger Mueller Flame Detector Management: In gas turbine applications, VTUR oversees the monitoring of eight Geiger Mueller flame detectors. These detectors, linked to the TRPG, rely on an external power supply of 335 V DC and 0.5 mA. This monitoring is essential for early detection of flame irregularities, ensuring swift response and mitigation in critical situations.

Control of Primary Overspeed Trip Relays: VTUR plays a key role in controlling three primary overspeed trip relays situated on the TRPG terminal board. The controller generates trip signals, which are then transmitted to VTUR and subsequently to TRPG. This chain of command triggers emergency solenoids, efficiently executing the turbine overspeed trip protocol. Importantly, this trip can originate either from VTUR or VPRO, offering redundancy and reliability in safety protocols.

Interface with Electrical Trip Devices (ETD): TRPG houses nine magnetic relays designed to interface with three trip solenoids, known as Electrical Trip Devices (ETD). In TMR (Triple Modular Redundancy) systems, nine relays are employed, while simplex systems utilize three relays. This arrangement ensures fail-safe operations and redundancy in critical trip mechanisms.

Installation

Prepare for Installation: Before commencing the installation process, ensure the VME processor rack is powered down completely. This step is crucial to prevent any potential electrical hazards or disruptions during the installation.

Positioning the Board: Carefully handle the board and align it with the designated slot within the VME processor rack. Sliding the board into the allocated slot requires steady and cautious movement to prevent damage to the board or the rack.

Secure Edge Connectors: To properly seat the board, apply gentle but firm pressure to the top and bottom levers. Pushing these levers inward helps securely seat the board's edge connectors into the corresponding slots within the rack. Ensure the connectors are firmly and correctly positioned to establish reliable connections.

Secure the Board in Place:After ensuring the board is correctly aligned and its edge connectors are seated, proceed to secure the board within the rack. Utilize the provided captive screws located at the top and bottom of the board's front panel. Carefully tighten these screws to firmly secure the VTUR board in its designated position within the rack.

Verification and Testing:Once the board is securely installed and all screws are tightened, conduct a thorough inspection to verify proper installation. Ensure there are no loose connections, and the board sits flush within the rack. Following installation, power up the VME processor rack and perform necessary tests to confirm the board's functionality and integration within the system.

Generator and bus voltage sensors

The generator and bus voltage sensors consist of two single-phase potential transformers (PTs), each designed to provide a secondary output of nominal 115 V rms. These PTs are meticulously engineered to ensure minimal loading, with each input consuming less than 3 volt-ampere (VA) of power.

Critical to their operation is the allowable voltage range for synchronization, which spans from 75 to 130 V rms. This range ensures that the sensors can accurately monitor and assess voltage levels within the specified parameters, thereby facilitating precise synchronization of the system.

Moreover, each PT input is equipped with magnetic isolation, featuring a robust 1,500 V rms barrier. This isolation mechanism serves to safeguard the integrity of the signals and prevent any potential interference or disturbances, thereby enhancing the reliability and accuracy of the voltage sensing process.

In terms of installation flexibility, the sensors accommodate cable lengths of up to 1,000 feet, utilizing 18 AWG wiring. This extensive cable length capability enables the placement of sensors at strategic locations across a considerable distance, ensuring comprehensive coverage and monitoring of voltage levels throughout the system.

Synchronizing Modes

Off Mode: In this mode, the breaker remains open, and the Mark VI control system does not initiate its closure. The check relay, typically the K25A, remains in its deactivated state.

Manual Mode: Operators manually initiate the closure of the breaker. The closure process is still subject to the synchronization checks performed by the K25A Sync Check contacts, driven by the I/O controller. The manual closure is typically initiated from an external contact on the generator panel, often connected in series with a manual sync mode contact.

Auto Mode:The system automatically performs voltage and speed matching, followed by precise timing for breaker closure. Before closure, three critical functions must agree:

K25A (Sync Check Relay): Monitors the allowable slip/phase window, sourced from VPRO.

K25 (Auto Sync Relay): Provides precise synchronization, typically controlled by VTUR.

K25P (Sync Sequence Permissive): Checks the turbine sequence status, also sourced from VTUR.

Synchronization Sequence: It's essential for the K25A relay to close before K25 to avoid interference with auto sync optimization. Failure to execute this sequence triggers a diagnostic alarm, activates a lockout signal, and may prevent further synchronization attempts until a reset is issued. Detailed checks and coordination of these functions are crucial for ensuring successful and safe synchronization operations.

IS200VTURH1BAA Technical Specifications

Manufacturer General Electric

Series Mark VI Speedtronic

Functional Part Number IS200VTURH1BAA

Functional Description Primary Turbine Protection Card

Revision Total 3 Revisions

Backwards-Compatibility 1st two revisions

Assembly Type Normal Assembly

About the IS200VTURH1BAA

The IS200VTURH1BAA board is part of the GE Mark VI Speedtronic system. This control system is used for the control and maintenance of steam or gas industrial turbines. The Mark VI Turbine Control System Series that this specific IS200VTURH1BAA Primary Turbine Protection Card device is a component member of must be considered a whole functional upgrade from the previous industry-standard Mark V Turbine Control System Series of more or less the exact same full extended GE product series title, as the Mark VI Series embraced the alternative energy-focused wind turbine automated drive application, adding on to the gas and steam-based turbine environments previously established through the Mark V Series. This IS200VTURH1BAA Primary Turbine Protection Card product's greater Mark VI Series is also held in high esteem as one of the final-produced GE Mark product series making use of the patented Speedtronic control system technology across a range of devices.

Hardware Tips and Specifications

The IS200VTURH1BAA is a primary turbine protection card. This IS200VTURH1BAA Primary Turbine Protection Card product's IS200VTURH1BAA Primary Turbine Protection Card functional product number describes a series of relevant IS200VTURH1BAA Primary Turbine Protection Card Board hardware specifications through a series of consecutive functional naming chunks. Some of these specific details include this IS200VTURH1BAA Primary Turbine Protection Card product's domestic original GE manufacture location, its group one Mark VI Series product grouping, its conformal PCB Coating style, and its three-fold significant product revision table. Some of the various functions of this IS200VTURH1BAA Primary Turbine Protection Card Mark VI Series product include:

Controlling (3) overspeed trip relays located on the TRPx terminal board. This board has nine magnetic relays that are interconnected with three trip solenoids. In TMR systems all nine relays are used. In Simplex systems, only three relays are used.

Monitoring (8) Geiger-Mueller flame detectors. These are used only in gas turbine applications.

Monitoring induced shaft current and voltage

Closing the main breaker/providing automatic generator sync.

Measuring turbine speed using (4) passive pulse rate devices.

The IS200VTURH1BAA can be installed in a VME processor rack only when it is powered down. The board should be pushed in using the top and bottom levers to seat edge connectors. Then use the captive screws (top and bottom) to secure the board into place within the rack system. The narrow front panel has only these captive screws, a single d-shell connector, and three LED indicators. The indicators are labeled Status, Fail, and Run. The board is designed to measure turbine speed from up to four pulse rate signals. This is in simplex applications. The board can also be used in TMR applications but picks up signals differently. For more information regarding the IS200VTURH1BAA, please refer to publications from General Electric that provide information, such as product user guides or Mark VI manuals. These will also have important information regarding handling and installation processes.