

# Speedtronic Mark V IDOS / HMI for E&I Specialists

## Course Information

### GENERAL INFORMATION ABOUT THE TRAINING COURSE SPEEDTRONIC MARK V IDOS / HMI for E&I SPECIALISTS

(Reference number: [37514486](#))

The gas turbine control system, 'Speedtronic', since 1968 has proven to be a highly reliable system to control and protect stationary gas turbines of General Electric design.

Mark V is the completely computerized version of the Speedtronic control system, which has been on the market since 1992 and is now utilized in hundreds of units throughout the world in both heavy duty and aero derivative gas turbines.

The operator interface for the Speedtronic, can be a DOS or a Windows NT based computer system, resp. IDOS or HMI. HMI is a Windows based computer station with CIMPLICITY as SCADA program.

The Mark V Speedtronic has such a high degree of reliability that end user control specialist rarely get the opportunity to gain experience in the calibration or troubleshooting of their own control systems.

This lack of experience often results in long unnecessary outages when malfunctions occur.

The training course is exclusively meant for employees of end users of gas turbines (companies with one or more operating gas turbines or companies that are going to operate one or more gas turbines).

To ensure end user personnel are fully competent, Ansaldo Thomassen B.V. offers a five-day "Speedtronic Mark V IDOS/HMI" training course, during which the control and protection systems shall be explained and discussed in detail.

The training participants should be familiar with analog and digital control techniques. They should also have a thorough understanding of the principles and operational aspects of the subject gas turbine for their assistance. If required they can participate in the open training course "Heavy-Duty Gas Turbines" in week 37 (2010) at Ansaldo Thomassen B.V.

The enclosed program gives more details about the contents of the training course.

This training course will be organized in:

**WEEK 39 (27 SEPTEMBER – 01 OCTOBER 2010)**

## COMPLETE TRAINING PROGRAM

(A simulated gas turbine application will be used with standard IDOS / HMI screens)

### FIRST DAY

- **Introduction**
  - Make acquaintance, presentation of the program
  - Discussion of subjects of special interest to the participants
- **Introduction Speedtronic Mark V**
  - Triple redundancy of the Mark V
  - Basics of gas turbine protection
  - Basics of gas turbine controls
- **Speedtronic Mark V hardware**
  - Panel discussion
  - Mark V modules
  - Internal and external Mark V wiring
  - Hardware documentation
  - The main protection system
  - Supply voltage

### SECOND DAY (IDOS / HMI DAY)

Simultaneously IDOS and HMI will be discussed.

- **Data structure of the operator interface**
  - Brief discussion of the related operator interface
  - Most important files of the operator interface and their function, TCI (Turbine Control Interface) / IDOS
  - Failure of the operator interface, what to do
  - Communications with the operator interface, Arcnet and DCS communications
- **Operator interface facilities (IDOS / TCI functions)**
  - The "logic forcing display"
  - The "rung display"
  - The "prevote data display"
  - The "trip history display"
  - Alarm display
  - Trouble shooting procedure
  - The "backup operator interface"
  - Control constants adjust
  - "Control sequence editor"
  - "Control sequence documentor"
- **Mark V tools (all in practice)**
  - Short / long term trending
  - Historical trip display
  - View2 function, the ultimate trouble shooting tool for control specialists
  - Alarm display (explain function)
- **CIMPLICITY / IDOS ANIMATION EDITOR**
  - Theory: frame containers, database etc.
  - Practical: how to modify a screen.

### THIRD DAY

- **Mark V software structure**
  - CSP, control sequence printout
  - Programming languages of the Mark V
  - Variable types
  - Mathematical rules within the Mark V

- **Practice: Making Mark V software**
  - Digital input (going through all the steps, IO report, assign file, control constant, MK5MAKE, editor)
  - Analog input with software by students
  - Digital input with software example by students
- **Gas turbine sequence**
  - Control modes, Start up and permissive for start, Purging the turbine and/or boiler with stack, IGV sequence, Normal stop, Emergency stop
- **Discussion of the following controls and sequencing**
  - Fuel control
    - o Start up, Speed, Acceleration, Temperature, Shut down control and Manual FSR control
  - Special control loops
    - o Inlet Guide Vane, Anti icing, Water / steam injection and Start and stop control loops
  - The protection systems
    - o Flame detection, Over speed, Vibration, Exhaust temperature, Lube oil pressure and temperature, Fire protection system.
- **Discussion of the following controls and sequencing**
  - Synchronization, auto and manual
  - Power factor control MVAR control
- **Dry Low NO<sub>x</sub>**
  - Explanation of the system
  - Discussion of the controls, implementation in Mark V controls and logics

### FOURTH DAY

(practical, running a simulated gas turbine application)

- **Trouble shooting, alarm analysis and limited software changes in practice:**
  - Mark V alarms (what to do when a specific Mark V card is defect)
  - Alarm display
  - What to do when an alarm of the gas turbine pops up (flow chart explanation)
  - Exercise of different simulated alarms trouble shooting
  - Changing control constants, adding alarms, instrumentation (continuation of the practical part of day 3)

### FIFTH DAY (practice day)

- **Trouble shooting, actual situations**
  - Several cases as an exercise "not ready to start"
  - First failure analyses for trips (emergency stop)
- **Remaining subjects**
- **Evaluation of the gas turbine course**

### Instructors

A qualified instructor of Ansaldo Thomassen B.V. will present the course. He is a full-time professional with vast experience in all aspects of gas turbine operation, maintenance and control technology.

### Training manual / computer simulation program

Each trainee will receive a training manual, covering the relevant subjects of the training course, and a CD-ROM with additional reference information. During the training the hardware and software of the Mark VI system are discussed. The software will be installed on a number of PC's for practicing purposes. The practicing will be done using a Mark V simulator.

To support the discussed subjects, a calculation and a simple simulation program will be used. The participants will receive a copy of this program.

### Language

The training will be executed in English. The manuals are in the English language as well.

### Training location

The training course will be held close to the Ansaldo Thomassen buildings, which are part of the Business-Park in Rheden, The Netherlands. A visit to the work and repair shops is part of the training program.

### Training duration

Monday	09.30 - 16.30
Friday	09.00 - 15.00
Other days	09.00 - 16.30
Lunch	12.00 - 13.00

A lunch in the company dining room will be provided free of charge, by Ansaldo Thomassen B.V.

### Pricing / Payment conditions

For the Speedtronic Mark V IDOS / HMI training course, the cost will be: **EUR 2.325,-** per person.

Payment in advance after receipt of our invoice:  
EUR bank account: IBAN: NL37 COBA 0637 0361 23 (preferably) or account 063 70 36 123.  
BIC (Swift code): COBANL2X  
at Commerzbank AG - Amsterdam, The Netherlands.

### Registration

If you wish to participate in the course register online at [www.ansaldothomassen.com](http://www.ansaldothomassen.com) or complete the registration form on the next page and fax or mail it, at least 14 days prior to the start of the course, to:

#### **Ansaldo Thomassen B.V. Customer Training**

Attn.: Mrs. M. van Breemen

PO Box 95

6990 AB Rheden

The Netherlands

Tel: +31 26 49 75 894

Fax: +31 26 49 75 857

E-mail: [mirjam.vanbreemen@ansaldothomassen.nl](mailto:mirjam.vanbreemen@ansaldothomassen.nl)

Receipt of the registration forms will be formally confirmed.

The maximum amount of participants will be 12.

### Cancellation

If you have received a registry confirmation but are forced to cancel due to circumstances beyond your control, you can cancel the registration up to one week before the course commencement date. The paid amount will then be refunded. After this date, or in the event of a no-show, no amount will be refunded.

In the event of too few participants, the training course may be cancelled or deferred to a later date. A cancellation notification will be sent one week prior to the course start date. Ansaldo Thomassen is not responsible for any expenses related to non-refundable airline tickets or hotel accommodations.

### Hotel accommodation

As an attachment to the registry confirmation, you will receive a list of hotels in the vicinity of Rheden, and a map showing the route to the training location.

### Further information

If more information concerning the training course is required, or if you need information about other training possibilities, please do not hesitate to contact our Customer Training department at the above-mentioned address.

### Specific questions

For specific technical questions about this training course please contact:

Mr. A.T.F. de Kler BSc MSc

Tel: +31 26 49 75 871

E-mail: [albert.dekler@ansaldothomassen.nl](mailto:albert.dekler@ansaldothomassen.nl)

## Speedtronic Mark V IDOS / HMI for E&I Specialists

### Registration Form (Please return at least 14 days prior to commencement of the training course)

Full Name and Job Title \_\_\_\_\_

Organization \_\_\_\_\_

Street / PO Box \_\_\_\_\_ no. \_\_\_\_\_

City \_\_\_\_\_

Postal code \_\_\_\_\_

Country \_\_\_\_\_

Telephone number \_\_\_\_\_

E-mail address \_\_\_\_\_

VAT number \_\_\_\_\_

Your order number for this registration \_\_\_\_\_

Wishes to participate in the training course "Speedtronic Mark V IDOS / HMI for E&I Specialists" in:

**WEEK 39 (27 SEPTEMBER – 01 OCTOBER 2010)**

Under the conditions as mentioned in our course information with reference number: **37514486**. Cost EUR 2.325,- per person.

In what way are you involved in Heavy-Duty gas turbines and the Speedtronic Mark V controls?

Which type of gas turbine are you particularly interested in?

\_\_\_\_\_  
\_\_\_\_\_

Place \_\_\_\_\_

Date \_\_\_\_\_

Name \_\_\_\_\_

Signature \_\_\_\_\_



Please send to:

**Ansaldo Thomassen B.V.**

**Customer Training**

Attn.: Mrs. M. van Breemen

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6990 AB Rheden

The Netherlands

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Internet: [www.ansaldothomassen.com](http://www.ansaldothomassen.com)