Phone: +91-9896600003
Email : sales@naugralabequipments.com

Product Name :	**Product Code :**
Complete training system for AC Industrial Drives	CE111

Description :

Complete training system for AC Industrial Drives

Technical Specification :

Complete training system for AC Industrial Drives
Complete training system for study of Drives with Educational Frequency Converter with minimally the following characteristics:
Objectives
Protective measures and electrical safety
Set-up of power generating systems according to circuit diagrams
Putting electrical drives into operation
Recording of load characteristics with various operating parameters
Achieving skills in measuring electrical machines
Automatic speed control for an asynchronous (induction) machine
Topics
Rotating field and space vectors
Modulation types: square, trapezoidal, sinusoidal, pulse width modulation (PWM)
Voltage vector control VVC
Magnetisation with a linear V/f characteristic
Boosting of magnetisation by means of the start voltage
Optimisation of load characteristics by means of IxR compensation
Slip compensation
Brake choppers
Variable-speed drives

The experiment is complete, with all necessary hardware, software, experimental and device manuals and accessories to perform the experiments.
Each system is composed minimally by the following components:
1x Universal Inverter
Transistor pulse converter with voltage link for the generation of a three-phase, frequency and amplitude-variable output voltage from an AC mains. This unit in conjunction with the corresponding control unit is used to assemble a frequency converter or servo amplifier. Technical description:
Three-phase inverter built with IGBT (insulated gate bipolar transistor)
Operating frequency 20 kHz, resulting in good of sinusoidal current as well as low noise build-up in the machine
Output short-circuit proof, earth-fault proof and switch proof
Interface for connection of the control unit (25-pole sub-D socket, TTL level)
Each individual transistor can be switched on and off via the interface and is protected from damage with an interlocking device
The respective activated IGBT's are displayed via LEDs
Monitoring of the variable link voltage, machines and converter excess temperature, excess currents in the rectifier and inverter. Output of the switching status via interface and display via LEDs
Integrated brake chopper
Safe separated extra-low voltage (SELV) between the power component and the control unit
Output currents are detected via Hall generators. Electrically separated output via interface
2 stage mains filter for the reduction of the line-bound interference
3-phase motor filter for the reduction of the edge steepness of the pulse voltages at the converter output to values
Technical Specifications:
Output voltage (UA): 3 x 0...230 V
Output current (IA): max. 3 x 8 A
Supply voltage: 200...240 V, 50/60 Hz via 4-mm safety sockets
Scope of Delivery:
Contained within the scope of supply: 25-pin connection cable.
1x Rectifier B6, 3X400V
Uncontrolled mains rectifier in three-phase bridge circuit for the generation of a DC voltage from a three-phase mains. For the generation of link voltages with converters,
switched-mode power supplies and in drive technology.
Nominal voltage (UN RMS): 3 x 400 V
Nominal current (INAV): 10 A
Surge forward current (IFSM): 300 A
I2t-value: 450 A2s
Conducting state voltage (UF): 1 V (per diode)
1x Converter I/O
This connection panel enables the student to perform basic experiments with the universal converter, manual control of the power transistors and/or output of all status messages, control signals as well as galvanically isolated actual current values.
Input/outputs (TTL-level): -PH1/1, PH1/2, PH2/1, PH2/2, PH3/1, PH3/2 for the control of the power transistors via the bridging plugs or TTL-signals, can also be used as measurement output for displaying the control signals on the oscilloscope -Inhibit, chopper control input, clear -Status outputs for:
Motor temperature, brake chopper signal, converter faults, converter ready signal Inputs/outputs (analog signals): -0...5 V corresponding to the trigger angle 180...0 degrees of the converter/rectifier
Output for current of phases 1, 2 and 3
Output current magnitude sum
Power supply from the universal converter via 25-pin sub-D socket.
Contained within the scope of delivery: 25-pin connection cable
1x Squirrel Cage Motor 230/400V 300W
Three-phase asynchronous motor with squirrel cage rotor. Machine with one shaft end is insulated built on an aluminium base with glides. The machine is to be operated on the machine bench. All connections are brought

out on the overhead connection box separated on 4 mm safety plugs. The nominal ratings are mounted on three rating plates on the connection box. The machine is protected by a built-in stator winding temperature switch against overload. In addition to the protective conductor connection attachment for potential equalization line via M6 thread on the connection box is also provided.
Ratings:
Power: 0.25kW
Voltage: 400 /230V Y / ?
Current: 0.76 /1.32 A
Frequency: 50 Hz
Power factor: 0.79
Design: 4 pole
Speed: 1350 min -1
1x Converter Controller with software Scalar frequency inverter:
FrControl unit with microcontroller for the assembly of a frequency
converter in accordance with the PWM characteristic curve method in operation together with the universal converter. A three-phase pulse width modulator controls the six power transistors of the universal converter and thus generates a sinusoidally-shaped motor current. The r.m.s. value of the motor voltage is set in accordance with a programmable, dynamically adapting U/f characteristic.
Block commutation:
Control unit with microcontroller for the assembly of a highlydynamic AC servo drive with block signal-shape commutation in operation together with the permanentlyexcited brushless DC machine (AC servo), the universal converter and the commutation pick-up. Alternatively, a synchronous or a multifunction machine 0.3 kW can be used. The pulse width modulation is selected so that block-shaped currents are generated in the motor windings. The digital controllers for current, speed and positioning are arranged in cascade configuration. The actual speed value is generated internally out of the commutation signals or measured with an incremental tacho-generator. Commutation signals can also be used for positioning with low resolution (30 degrees). Higher resolution servo positioning is possible by connecting an external servo controller via the parallel interface and an external position pick-up.
Sinus commutation:
Control unit with microcontroller for the assembly of highly dynamic AC servo drives with sinusoidal signal-shape commutation in operation together with the permanently-excited brushless DC machine (AC servo), the universal converter and the resolver. Alternatively, a synchronous or a multifunction machine 0.1/0.3 kW can be used. The pulse width modulation is designed so that sinusoidal shaped currents are generated in the motor windings. The digital controllers for current, speed and positioning are arranged in cascade configuration. The actual speed value is generated internally out of the resolver signals. The resolver permits positioning with high resolution.
Position Controller:
The microprocessor-controlled digital position controller, in conjunction with the AC servo drive with block commutation, is used to set up a high-precision single-axis positioning drive. Actual positions can be recorded either with the incremental tacho 0.3 (which
supplies 1024 pulses per rotation) or the linear unit with a position encoder 0.3
Measuring system:
The measuring system is a combination of a potential-free and differential oscilloscope, multimeter, wattmeter, energy analyser and recorder. Its concept has been designed for demonstration and laboratory testing.
IN DETAIL
Simultaneous measurement of U, I, ju, j, f and P in 4 channels
Instantaneous values U, I and P
Averaged values U, I and P
RMS values (AC + DC) U and I
RMS values (AC) U and I
Fundamental wave filters
Delta connection adjustment universal connection options
Via USB-Type C connection with PC or laptop

via the WLAN option with the school network or setting up your own access point automatic or manual range selection
Support for computer-aided measurements and simple to highly complex evaluations.
Formula
Electrical power calculation S, P, QC and QL
Electrical work WS, W and WQ
Resistance calculation R, Z, XC, XL, G, Y BC and BL
Positive sequence component, negative sequence component and zero sequence component in 3-phase systems
Derivative with respect to time, integral over time, FFT analysis, mean value, histogram, and model
Drivers allow you to evaluate the data with
LabVIEW and MATLAB
Possibility of manual operation directly on the device by means of a rotary selector with cursor keys
Direct reading in 9 cm, backlit display
Display of up to 24 measured values in one display
Display of all values for each channel
Display of all values in tabular form
Display of measured values in diagram
Display of a vector diagram
Wireless connection via WLAN for experimenting with tablet and smartphone (iOS, Android and Windows)
Measuring instrument category CATIII 300: allows the use of the measuring instrument from tests with safety extra-low voltage (SELV) via 3-phase systems with or without neutral conductor up to testing in power electronics, eg. B. DC link voltage of 700 V DC
FPGA-based real-time processing in the device enables comprehensive network analysis in the threephase networks, which are displayed directly on the device in the vector diagram

Technical specifications:
DISPLAY & OPERATION
Graphic display: 9 cm (3.5 "), QVGA, colored, light (adjustable up to 400 cd / m²)
Operation: Pushbutton and incremental encoder with pushbutton
Inputs & Outputs
Inputs: 4 isolated measuring channels CAT III 300, each with I and U measurement (max. 8 can be used at the same time)
Input A -D: U and I connection via 4 mm safety sockets
Measuring ranges U: 25/70/250/700 VAC ± 36 / ± 100 / ± 360 / ± 1000 VDC
Measuring ranges I: 0.7 / 1.6 / 7/16 / AAC ± 1 / ± 2.5 / ± 10 / ± 16 ADC
Sampling rate: max. 1,000,000 values / s per channel at U and I max. 500,000 values / s
General
Loudspeaker: Error message when exceeding the measuring ranges
Data storage: 100,000 readings for each measurement series, built-in Micro SD card (4 GB) for over a thousand measurement files and screenshots
WLAN: 802.11 b / g / n as access point or client (WPA / WPA2)
VNC server: integrated
USB ports: Connect a USB Type C
Mains voltage: 230 V 50 - 60 Hz (conversion to 115 V possible)
Connected load: 50 W
Dimensions: 300 mm x 300 mm x 180 mm
Weight: 3.7 kg
Scope of Delivery:
Power cord
USB A / C cord
Includes software with the following characteristics: Software for recording and evaluating measurement data acquired via

Three phase high power measurement device, with comprehensive integrated help functionality and many operable experiment examples.
Including measurement server for the distribution of live measurements, table and diagram as well as measurement files on tablets or smartphones.
School license for use on any number of PCs in a school or institute
Supports up to 8 measurement devices, via USB-ports
Supports Joule and Wattmeter and Universal Measuring Instrument
Supports sensor boxes
Additionally supports numerous devices via the serial interface (e.g. VideoCamera IRPD, balance)
Connection to the integrated measurement server in the local network via QR code
"Plug and play" enabled for easy use: the software automatically detects the connected devices and sensor boxes and displays these graphically, inputs and outputs are activated simply by pointing and clicking and typical experiment parameters are automatically loaded (depending on the connected sensor box)
Measurement data can be displayed in the form of analog/digital instruments, tables and/or diagrams (also simultaneously, with user-definable axis assignment)
Measured values can be recorded manually (at keystroke) or automatically (choice of time interval, measured time, lead time, trigger or additional measurement condition)
Powerful evaluation functions including various fits (straight line, parabola, hyperbola, exponential function, free fitting), integrals, diagram labeling, calculation of user-definable formulas, differentiation, integration, Fourier transforms
Experiment files in XML-data format
Convenient exporting of measurement data and diagrams via the clipboard
"Logbook" function lets you briefly document other experiment information in the experiment file
Complete with more than 150 experiment examples from physics, chemistry and biology with detailed descriptions - Graphical display, sensor box and connector allocation when the experiment file is loaded
Free updates and demo version available through our internet homepage
The software support vector diagrams (real time) and plot angles
The software CD contains two Windows programs in German and English, one for the recording of characteristics of electrical machines and one for the control of the modular frequency converter.
1x Experimental Manual
Frequency converter technology, drives. Basic theoretical information’s, equipment descriptions, experiment instructions, in English, also available in pdf and as a interactive html literature embedded in a school, classroom, inventory and literature management system in the format of an online portal
1x Power Supply
Cam switch 2-pole
Automatic circuit breaker FAZ L 10 A Phase monitor light L 1
Phase monitor light for indication of false polarity of mains plug
Mains connecting cable with Schuko plug
1x Panel Frame
two-level, T-base, without channel.
Height: 73,0 cm
Width: 124 cm
Depth: 30 cm
1x Set of Bridging Plugs
ten 4-mm safety bridging plugs with 19 mm spacing, colour black, max. current rating: 32 A.
1x Set of Safety Connecting Leads Black/Blue/Red
2 each safety connecting lead, red 100 cm
2 each safety connecting lead, blue 100 cm
2 each safety connecting lead, red 50 cm
2 each safety connecting lead, blue 50 cm
2 each safety connecting lead, red 25 cm
2 each safety connecting lead, blue 25 cm
4 each safety connecting lead, black 100 cm

6 each safety connecting lead, black 50 cm
6 each safety connecting lead, black 25 cm
4 each safety connecting lead, black 10 cm
Plugs and sockets: 4 mm diameter (nickelplated)
Conductor cross-section: 2.5 mm2
Steady current: max. 32 A
Contact resistance: 1.8 m?
1x Set of Safety Connecting Leads Yellow/Green
4-mm safety connecting leads with 2.5 mm2 cable, current rating 32 A, consisting of:
4 each safety connecting lead,yel/grn 100 cm
4 each safety connecting lead,yel/grn 50 cm
2 each safety connecting lead,yel/grn 25 cm.

Naugralabequipments

Website: www.naugralabequipments.com, **Email:** sales@naugralabequipments.com

Address: 6148/6, Guru Nanak Marg,Ambala Cantt,Haryana,India. **Phone:** +91-9896600003