

About AEG Power Solutions

AEG Power Solutions Group is a global provider of power electronic systems and solutions for all industrial power supplies and offers one of the most comprehensive product and service portfolios in the area of power conversion and power controlling. The two complementary operating business units Renewable Energy Solutions (RES) and Energy Efficiency Solutions (EES) are serving customers worldwide. The RES product and service portfolio consists of systems and solutions for solar power plants like solar inverter, monitoring and control systems as well as power controller. The EES product and service portfolio includes high performance uninterruptible power supplies (USPs), industrial power controller and DC-converter.

Thanks to its distinctive expertise, bridging both AC and DC power technologies and spanning the worlds of both conventional and renewable energy, the company creates innovative solutions for smart grids.

AEG PS' footprint is global including 17 subsidiaries and competence centers around the world, employing 1,650 employees.

AEG Power Solutions Group is the sole subsidiary of the holding company 3W Power S.A. (WKN A0Q55X/ISIN GG00B39QCR01), based in Zwaneburg in the Netherlands. Shares and warrants of 3W Power are admitted to trading on NYSE Euronext, Amsterdam (ticker symbol: 3WP and 3WPW, respectively). Additionally, the shares are traded on the Frankfurt Stock Exchange (ticker symbol: 3W9)

Rely on the experts

As a world-class system provider AEG Power Solutions offers their customers a global network of service centers supported by field engineers.

From power solution selection to process installation and commissioning, the work of our certified experts exceeds expectations while their excellent service helps to achieve the lowest operating cost for mission-critical power solution. A global service team renowned for its short response time and troubleshooting efficiency ensures the reliability of your installed power solution.

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AEG Power Solutions GmbH

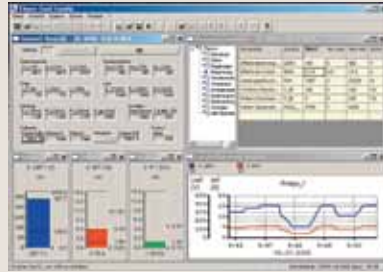
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Thyro-Tool



Thyro-Tool Family

The Thyro-Tool Family is a start-up and visualization software for power controller, multilingual in DE, EN, FR, CH.

Thyro-Tool Family operates under Windows and is designed to connect with the power controller via a serial interface or an optical cable.

Key functions are:

- » Parameterization and setting of the devices
- » Set point processing
- » Operating hours counter
- » Energy display (in kWh)
- » Displaying, loading, storing, changing and printing of all relevant measurements and display values
- » Comparison for two parameter sets

The Thyro-Tool Family allows a simultaneous presentation of several bar and line charts with variable size and composition. Furthermore data and parameters as inputted can be displayed from several power controllers. A maximum of 998 Thyro-P power controllers can be connected via an optical cable distribution (LLV).

Thyro-Tool AX

As tailored software for the Thyro-AX, this is the continuation of the Thyro-Tool Family. Priority is given to user friendliness and broader overview for monitoring several connected thyristor power controllers.

The Thyro-Tool AX is easy to connect via USB interface to the Thyro AX. The assignment of devices will be done system driven via IP address. Therefore individual analysis's can be done for each connected Thyro-AX (such as parameter, set point, actual point and line diagrams analysis). Furthermore device parameters can be compared with each other.



PROFIBUS-DP Interface



DeviceNet Interface



Thyro-Power Manager

Communication

The bus modules are qualified for the optional connection of up to 8 power controllers of Thyro-A, Thyro-AX and Thyro-S.

Bus modules are available for the following bus systems:

- » PROFIBUS DP V1
- » DeviceNet
- » Modbus RTU
- » CANopen
- » Additional types on request

Bus modules operate as slave bus sharing units and need only one bus address. Therefore several bus modules can be connected to the bus at the same time.

The data transfer includes according to the used power controller:

- » Set point
- » Load voltage
- » Mains voltage
- » Active power
- » Remote signals
- » Status messages

On request further data of the power controller can be accessed, whereby additional functions are realizable.

Bus modules are mountable on DIN rail and operate with a supply voltage of 24 V DC (150 mA).

Key features are:

- » Per bus module only one address is necessary
- » Access to set points, actual points and parameters of the power controller
- » Transfer of set points as float number in physical units
- » Function control via LED's
- » 8 outputs
- » Control of Thyro-S via digital set points (according to OFF, 1/5, 1/3, 1/2, ON)
- » Voltage supply 24 V DC, 150 mA

Thyro-Power Manager

The Thyro-Power Manager is an additional device for static main load optimization of a multiple actuator configuration of up to 10 power controllers in the operating mode of full frequency package control (TAKT).

In addition the Thyro-Power Manager can be used for tasks such as monitoring of system load peaks, data logging, data monitoring and as an E/A-component.

Therefore the Thyro-Power Manager allows e.g. the repeatability of operating costs as an outcome of reduced load peaks and system perturbations – a primary challenge of each application.

Key features

- » Process documentation
- » Voltage supply 110 V/230 V; 50 Hz/60 Hz
- » Easy handling (switch and potentiometer)
- » Error and alarm output
- » Possibility of connection to field bus
- » Load and energy measurement
- » Measurement of mains voltage and temperature
- » Integrated operating hours counter



Thyro-Family

Thyro-S

Thyro-A

Thyro-AX

Thyro-P

STATE-OF-
THE-ART-
TECHNOLOGIE

DIGITAL POWER CONTROLLER



AEG Power Solutions presents the new Thyro-Family with the digital power controllers Thyro-S, Thyro-A, Thyro-AX and Thyro-P.

As an important part of the application process they assure product quality, reproducibility, communication capability as well as a high degree of availability.

The thyristor power controllers of AEG Power Solutions switch or regulate electrical energies worldwide and in nearly all industrial sectors, starting from simple up to complex applications for high-end actuators.

Owing to their precision and reliability AEG Power Solution thyristor power controllers offer security for all application processes where melting, heating, drying and forming is applicable.

To these count crystal growing applications in particular (e.g. silicon, sapphire)

Applications

- » Automotive industry
- » Chemical industry and mineral oil industry
- » Crystal growing
- » Furnace construction
- » Furniture industry
- » Glass industry
- » IR drying
- » Machine building industry
- » Packaging industry
- » Painting machines and printers

Certificates

- » Quality standard to DIN EN ISO 9001
- » Certification to UL 508
- » SCCR, according with UL 508A (100 kA short circuit test)
- » Canadian National Standard

- » CE-compliant
- » RoHS compliant 5/6
- » Secure separation between power and control section
- » Integrated semiconductor fuses

AEG Power Solutions offers with the Thyro-Family a comprehensive product scope of power controllers which is completely digital and bus-compatible.

This results in cost saving solutions especially supported by improvements in the areas of:

- » Process control
- » Process documentation
- » Commissioning period and costs
- » System availability
- » Amount of cabling

Thyro-Family



Thyristor switch Thyro-S

Thyro-S ...H1

- » Rated voltages
230 V, 400 V, 500 V
- » Rated currents up to 280 A
- » U_{mains} up to $0.43 \times U_{\text{nom}}$
- » Frequency
47 Hz to 63 Hz
- » Wear-free operation
- » Compact design
- » Easy handling and connection
- » 3 phase system by connecting two Thyro-S
- » Standard system interface
 - Optional bus connection
 - Connection to PC software Thyro-Tool Family
- » Control input with 24 V DC ($>3 \text{ V} = \text{ON}$)
- » Operating modes 1:1, 1:2, 1:3, 1:5
- » For resistive loads

Thyro-S ...H RL1

In addition to Thyro-S ...H1:

- » Load circuit monitoring
- » Possibility of additional external electronic supply 24 V DC/AC
- » Alarm relay

Thyristor power controller 1A/2A/3A

Thyro-A

- » Rated voltages
230 V, 400 V, 500 V, 600 V
- » Rated currents up to 1,500 A
- » U_{mains} up to $0.43 \times U_{\text{nom}}$
- » Frequency
47 Hz to 63 Hz
- » 1-/2-/3-phase
- » Standard system interface
 - Optional bus connection
 - Connection to PC software Thyro-Tool Family
- » Set point settings:
 - Analog input
0(4)-20 mA,
0(1)-5 V,
0(2)-10 V
 - Digital via bus system or PC software
- » Suitable for resistive and transformer loads
- » Soft-start function for transformer loads
- » Channel separation
- » Mains load optimization

Thyro-A 1A

- » Rated voltages
230 V, 400 V, 500 V, 600 V
- » Operating modes:
 - Full frequency package control TAKT
 - Phase-angle VAR
 - Half-wave frequency package control QTM
- » For 1 phase load between 2 phase or phase against neutral

Thyro-A 2A

- » Rated voltages
400 V, 500 V, 600 V
- » Operating mode:
 - Full frequency package control TAKT
- » For 3 phase economic circuits (delta connection or star connection without neutral)

Thyro-A 3A

- » Rated voltages
400 V, 500 V, 600 V
- » Operating mode:
 - Full frequency package control TAKT
 - Phase-angle VAR
- » For 3 phase load (star connection without neutral, star connection with neutral, delta connection or open delta)



Thyristor power controller Thyro-A

Thyro-A ...H1

- » Control types U, U²

Thyro-A ...H RL1

- » Control types U, U², I, I²
- » Alarm relay
- » Load monitoring
- » $R_{\text{warm}}/R_{\text{cold}}$ up to ≤ 6
- » Analog output 10 V/20 mA
- » Possibility of additional external electronic supply 24 V DC/AC

Thyro-A ...H RLP1

In addition to Thyro-A ...H RL1:

- » Control type P
- » Power indication at analog output

Options for Thyro-S/Thyro-A

- » Bus connection via bus module
 - PROFIBUS DPV1
 - Modbus RTU
 - Modbus TCP/IP
 - DeviceNet
 - CANopen
 - EtherNet/IP
 - PROFINET
- » Thyro-Tool Family for quick commissioning and simple visualization
- » Thyro-Power Manager for network load optimization of several power controllers

Thyristor power controller Thyro-AX 1A/2A/3A

Thyro-AX

- » Rated voltages from 24 V to 600 V
- » Rated currents from 16 A to 1,500 A
- » Frequency 47 Hz to 63 Hz
- » 1-/2-/3-phase
- » Standard system interface
 - Optional bus connection
 - Connection to PC software Thyro-Tool Family
- » Set point settings:
 - Analog input 0(4)-20 mA, 0(1)-5 V, 0(2)-10 V
 - Digital via bus system or PC software
- » Suitable for resistive and transformer loads
- » Network load optimization
 - Internal for operating modes QTM and TAKT
 - External via connection of Thyro-Power Manager
- » FlexConnect
- » USB 2.0 interface

Thyro-AX 1A

- » Rated voltages from 24 V to 600 V
- » Operating modes:
 - Full frequency package control TAKT
 - Phase-angle VAR
 - Half-wave frequency package control QTM
 - Switch control SWITCH
- » For 1 phase load between 2 phase or phase against neutral

Thyro-AX 2A

- » Rated voltages from 24 V to 600 V
- » Operating modes:
 - Full frequency package control TAKT
 - Switch control SWITCH
- » For 3 phase economic circuits (delta connection or star connection without neutral)

Thyro-AX 3A

- » Rated voltages from 24 V to 600 V
- » Operating modes:
 - Full frequency package control TAKT
 - Phase-angle VAR
 - Switch control SWITCH
- » For 3 phase load (star connection without neutral, star connection with neutral, delta connection or open delta)



Thyristor power controller Thyro-AX

Thyro-AX ...H RL2

- » Control types U, U², I, I²
- » Load monitoring
- » R_{warm}/R_{cold} up to ≤ 6
- » Analog output 0/2-10 V/0/4-20 mA
- » External electronic supply 85 V – 265 V (47 Hz – 63 Hz)
- » Graphic user interface via display and relay output (exchanger, status signals adjustable)

Thyro-AX ...H RLP2

In addition to Thyro-AX ...H RL2:

- » Control types P
- » Power indication at analog output

Options for Thyro-AX

- » Bus connection via bus module
 - PROFIBUS DPV1
 - Modbus RTU
 - Modbus TCP/IP
 - DeviceNet
 - CANopen
 - EtherNet/IP
 - PROFINET
- » USB and Ethernet for connection with PC software Thyro-Tool AX for quick commissioning and easy visualization
- » Thyro-Power Manager for network load optimization of several power controllers

Thyristor power controller Thyro-P 1P/2P/3P

Thyro-P

- » Rated voltages 400 V, 500 V and 690 V within the voltage range 184 V up to 759 V
- » Rated currents up to 2,900 A
- » Frequency 45 Hz to 65 Hz
- » 1-/2-/3-phase
- » Menu driven graphic user interface
- » Set point settings:
 - 2 analog inputs 0(4)-20 mA, 0(1)-5 V, 0(2)-10 V
 - Digital via bus system or PC software (RS232, LWL)
- » Control types U, U², I, I², P
- » Suitable for resistive and transformer loads as well as loads with high R_{warm}/R_{cold} up to factor 20 (MOSI mode)
- » Soft-start function for transformer load
- » Load circuit monitoring
- » Possibility of external electronic supply (AC 185 V - 550 V, 45 Hz - 65 Hz)

Options for Thyro-P

- » Bus connection via adapter card
 - PROFIBUS DPV1
 - Modbus RTU
 - DeviceNet
- » Patented ASM procedure for dynamic load optimization
- » Local display and operating unit (LBA): graphic capable and menu driven
- » Cabinet installation kit for LBA
- » Thyro-Power Manager for network load optimization of several power controllers
- » Thyro-Tool Family for quick commissioning and simple visualization

