Electron S.R.L.

Design
Production &
Trading of
Educational
Equipment

A26 – AC PROTECTION RELAYS

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The A26 Series of Protection Relays includes single and three phase, analogue, digital and programmable / PC connectable instruments that are specifically chosen to satisfy the great majority of education requirements.

Moreover, they are packaged in standard ELECTRON modules with accesses provided through 4 mm safety terminals, clear prints to show as much as possible of the instrument logic and obtain in this fashion the best ergonomic and user oriented industrial design.

As summarized in the table below, three basic instruments are available in each of the three families: analogue, digital and programmable.

The analogue family is available in the single-phase version, the digital family is available in both the single phase and three phase versions, the programmable family is obviously available for sophisticated three phase applications.

Needless to say, the analogue instruments can be tripled in each function, and their operational contacts connected among them to implement a three-phase protection system. As a matter of fact, this would give the students an opportunity to further understand and exercise protection logic.

For a more comprehensive description, refer to the individual sections of the catalogue.

	ANALOGUE	DIGITAL	PROGRAMMABLE AND PC CONNECTABLE
UNDER-OVER CURRENT	Ordering Code A2651 Single Phase 2 adjustable thresholds Two exchange contacts, one for under and one for over current	Ordering Code A2661 Three or Single Phase Each phase has 2 separate adjustable thresholds and two exchange contacts	Ordering Code A2671 Three Phase microprocessor controlled, programmable, with serial RS485 or optical fibre communication **OVER CURRENT**
UNDER-OVER VOLTAGE	Ordering Code A2652 Single Phase 2 adjustable thresholds Two exchange contacts, one for under and one for over voltage	Ordering Code A2662 Three or Single Phase Each phase has 2 separate adjustable thresholds and two exchange contacts	Ordering Code A2672 Three Phase microprocessor controlled, programmable, with serial RS485 or optical fibre communication **UNDER-OVER VOLTAGE AND UNDER-OVER FREQUENCY**
EARTH FAULT	Ordering Code A2653 Single Phase Adjustable minimum isolation threshold One exchange contact	Ordering Code A2663 Three or Single Phase Each phase has 1 minimum isolation adjustable threshold and one exchange contact	Ordering Code A2673 Three Phase microprocessor controlled, programmable, with serial RS485 or optical fibre communication **DIRECTIONAL EARTH FAULT AND OVER CURRENT**

A2651 - AC SINGLE PHASE ANALOGUE UNDER-OVER CURRENT PROTECTION RELAY

The A2651 is an AC single phase, 90° scale analogue, under-over current protection relay particularly suitable for education purposes as it shows, at a glance, the current value and the adjustable tripping thresholds.

The front of the instrument contains the reading scale with indicator arm, two tripping threshold adjustment screws and two LEDS that are lit when the Minimum and Maximum thresholds are exceeded. The thresholds are shown on the scale by two red LEDS.

It also contains 4mm safety connectors for powering the instrument with a power on switch, current input and output, and two exchange contacts, one for Min and one for Max, that are operated when the respective thresholds are exceeded.

The tripping times are adjustable separately for Min and Max.

When a three-phase protection is required, three A2651 can be used together and their contacts connected to implement the connection logic required.

Together with the A2652 and A2653, voltage and earth protection relays, it can form an integrated and comprehensive protection system.

Technical characteristics

Power supply: 230VAC, 50Hz
Max current: 10A
Contacts rating: 5A – 230V
Tripping delay: 0.1 – 20 sec

A2652 - AC SINGLE PHASE ANALOGUE UNDER-OVER VOLTAGE PROTECTION RELAY

The A2652 is an AC single phase, 90° scale analogue, under-over voltage protection relay particularly suitable for education purposes as it shows, at a glance, the voltage value and the adjustable tripping thresholds.

The front of the instrument contains the reading scale with indicator arm, two tripping threshold adjustment screws and two LEDS that are lit when the Minimum and Maximum thresholds are exceeded. The thresholds are shown on the scale by two red LEDS.

It also contains 4mm safety connectors for powering the instrument with a power on switch, voltage inputs and two exchange contacts, one for Min and one for Max, that are operated when the respective thresholds are exceeded.

The tripping times are adjustable separately for Min and Max.

When a three-phase protection is required, three A2652 can be used together and their contacts connected to implement the connection logic required.

Together with the A2651 and A2653, current and earth protection relays, it can form an integrated and comprehensive protection system.

Technical characteristics

Power supply: 230VAC, 50Hz
Max voltage: 600V
Contacts rating: 5A – 230V
Tripping delay: 0.1 – 20 sec

A2653 - AC SINGLE PHASE ANALOGUE EARTH FAULT PROTECTION RELAY

The A2653 is an AC single phase, 90° scale analogue, earth fault protection relay particularly suitable for education purposes as it shows, at a glance, the current value and the adjustable tripping threshold.

The front of the instrument contains the reading scale with indicator arm, the tripping threshold adjustment screw and one LED that is lit when the Minimum threshold is exceeded. The threshold is shown on the scale by one red LED.

It also contains 4mm safety connectors for powering the instrument with a power on switch, phase input and one exchange contact for Min that is operated when the threshold is exceeded.

The tripping time is also adjustable.

When a three-phase protection is required, three A2653 can be used together and their contacts connected to implement the connection logic required.

Together with the A2651 and A2652, current and voltage protection relays, it can form an integrated and comprehensive protection system.

Technical characteristics

Power supply: 230VAC, 50Hz
Insulation Ω: 0 to ∞
Contact rating: 5A – 230V
Tripping delay: 0.1 – 20 sec

A2661 - AC THREE PHASE DIGITAL UNDER-OVER CURRENT PROTECTION RELAY

The A2661 is an AC digital three phase, under-over current, programmable protection relay particularly suitable for average complexity educational purposes.

Each phase has its individual digital display, two alarm LED's each associated to one exchange contact and four pushbuttons to program the working parameters of the relay. The contacts can be freely associated to minimum or maximum thresholds. Default parameters are set at the plant and are recorded on the Electron Instruction Manual.

On the front panel there are 4mm safety connectors for powering the instruments, a power on switch, current inputs/outputs and two exchange contacts for each phase, one for Min and one for Max, that are operated when the respective thresholds are exceeded.

Together with the A2662 and A2663, voltage and earth protection relays, it can form an integrated and comprehensive protection system.

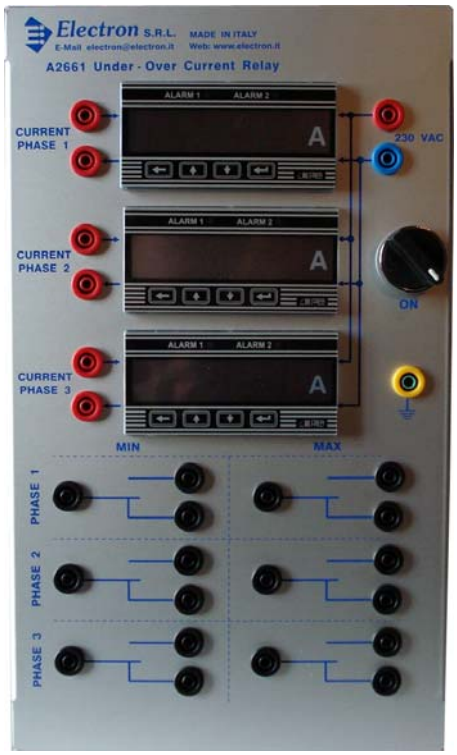
Single Phase Version

A2661/1 Single phase version with only one instrument

Technical characteristics

Power supply: 230VAC, 50Hz, 5VA
Max current: 10A
Contacts rating: 10A – 250VAC
Alarm setting: Min / Max / Off
On/Off delay: 0.1 – 9.9 sec (*)
Hysteresis: 0 ÷ 100%

(*) Actual delay range is 0.1 to 99.9 sec. but if it is set to 10 sec. or greater, the setting will be lost on Power OFF and will need resetting at power ON.



A2662 - RELAIS DE PROTECTION NUMERIQUE DE SOUS/ SURTENSION ET DEFAUT DE PHASE POUR C.A. TRIPHASE

Le A2662 est un relais programmable de protection numérique de sous/surtension et défaut de phase pour c.a. triphasé, particulièrement apte pour sujets didactiques de moyenne complexité.

Chaque phase a son afficheur individuel numérique, deux LEDs d'alarme chacune associée à un inverseur et quatre boutons pour programmer les paramètres du relais. Les contacts peuvent être librement associés à seuils de minimum ou maximum. Les paramètres par défaut sont réglés à l'usine et sont enregistrés dans le mode d'emploi.

Le panneau avant contient aussi des douilles de sécurité de 4mm pour alimenter l'instrument, un interrupteur de marche, les entrées de tension et deux inverseurs pour chaque phase, un pour Min et un pour Max, qui sont commutés quand les seuils respectifs sont dépassés.

Avec A2661 et A2663, relais de protection de courant et de défaut à la terre, on peut former un système de protection intégré et complet.

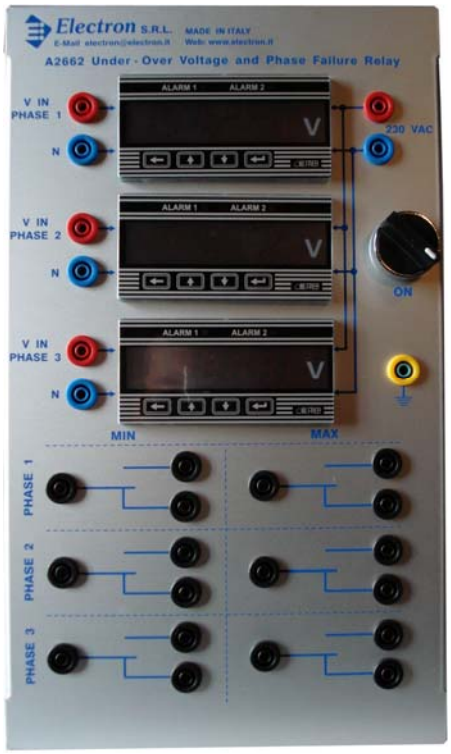
Version Monophasée

A2662/1 Version monophasé avec un seul instrument

Caractéristiques techniques

Alimentation: 230Vca, 50Hz, 5VA
Tension max: 600V
Valeur nominale contacts: 10A – 250Vca
Réglage Alarme: Min / Max / Off
Retard On/Off: 0.1 – 9.9 sec (*)
Hystérésis: 0 ÷ 100%

(*) L'étendue effective du retard est de 0.1 à 99.9 secondes, mais si le retard est réglé à 10 secondes ou plus, le réglage sera perdu quand on éteigne l'unité et il faudra le régler encore.



A2663 - AC THREE PHASE DIGITAL EARTH FAULT PROTECTION RELAY

The A2663 is an AC three phase, digital, programmable earth fault protection relay particularly suitable for average complexity education purposes.

Each phase has its individual digital display, one alarm LED (a second alarm LED is present and can be programmed but it is not active) associated to one exchange contact and four pushbuttons to program the working parameters of the relay.
Default parameters are set at the plant and are recorded on the Electron Instruction Manual.

On the front panel there are 4mm safety connectors for powering the instruments, a power on switch, phase inputs and one Min exchange contact for each phase, operated when the minimum thresholds are exceeded.

Together with the A2661 and A2662, current and earth protection relays, it can form an integrated and comprehensive protection system.

NOTE: The reading can be converted to actual resistance Ohms by cross referencing the number displayed by the instrument on the table printed on the front panel.

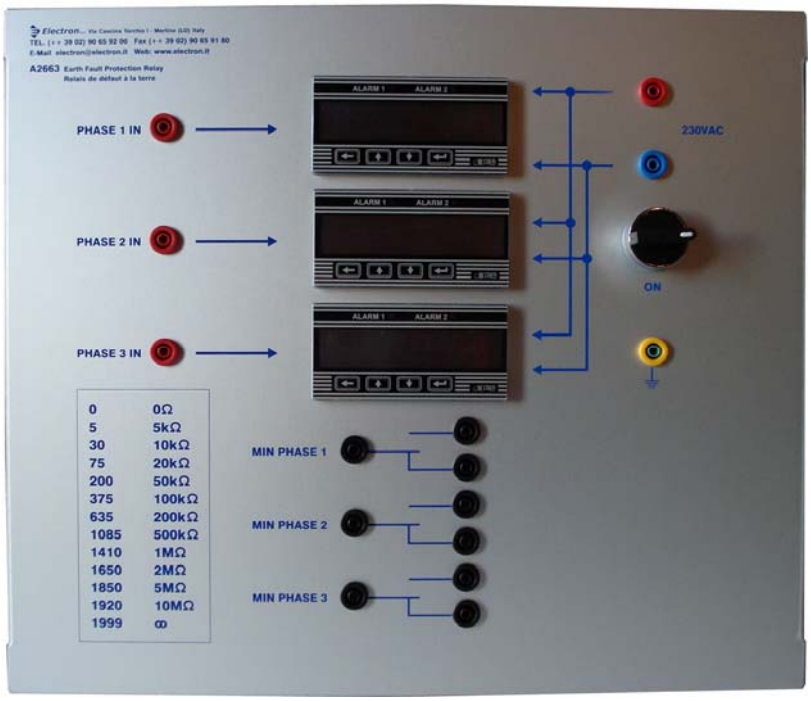
Single Phase Version

A2663/1 Single phase version with only one instrument

Technical characteristics

Power supply: 230VAC, 50Hz, 5VA
Insulation Resistance Ω 0 to ∞
Contacts rating: 10A – 250VAC
Alarm setting Min (factory default, cannot be changed)
On/Off delay: 0.1 – 9.9 sec (*)
Hysteresis 0 ÷ 100%

(*) Actual delay range is 0.1 to 99.9 sec. but if is set to 10 sec. or greater, the setting will be lost on Power OFF and will need resetting at power ON.



A2671 – AC THREE PHASE PROGRAMMABLE AND PC CONNECTABLE OVER CURRENT PROTECTION RELAY

This relay belongs to a series of modular, multifunction, programmable, microprocessor controlled protection relays designed for use in power distribution systems.

It is made in Italy and built according to the most advanced international standards.
Five pushbuttons and an 8-digit display allow easy, intuitive programming of the unit and 4 different modes of operation in order to set and measure the parameters:

- MEASURE, to access one of four display areas
- DISPLAY, to visualise the programmed parameters
- PROGRAM, to program the parameters
- TEST, to test the unit

All values are stored in a non-volatile memory and are maintained even in absence of power.
The unit is supplied with a set of default-programmed parameters that are listed on its user manual.

Operation

It protects against failures among phases and between phases and ground and is programmable for definite or inverse tripping times. Each function has an associated indicator with 3 possible states::

- Blinking: threshold is exceeded
- ON: set timing is exceeded
- OFF: normal status

It is has 4 x 5A output contacts that can be program-associated to one or more functions.

Serial Communication

On request it can be provided with a serial RS485 (Modbus protocol) or optical fibre connection and with the required Windows based SW for programming and operation from a PC.

Main Technical Characteristics

- 1st over-current threshold 0.25-4A
- 2nd over-current threshold 0.5-40A
- 2 nominal input current ranges: 1 or 5A, selectable

The unit is mounted on a standard ELECTRON panel with 4 mm safety connectors.

Power Supply

- Type 1: 24 to 110 VAC, ± 20%
  24 to 125 VDC, ± 20%
- Type 2: 80 to 220 VAC, ± 20%
  90 to 250 VDC, ± 20%

Note

Together with the A2672 and A2673, under-over voltage and directional over-current and directional earth fault protection relays, it can form an integrated, comprehensive and sophisticated protection system.

A2672 – AC THREE PHASE PROGRAMMABLE AND PC CONNECTABLE OVER/UNDER VOLTAGE AND OVER/UNDER FREQUENCY PROTECTION RELAY

This relay belongs to a series of modular, multifunction, programmable, microprocessor controlled protection relays designed for use in power distribution systems.

It is made in Italy and built according to the most advanced international standards.
Five pushbuttons and an 8 digit display allow easy, intuitive programming of the unit and 4 different modes of operation in order to set and measure the parameters:

- MEASURE, to access one of four display areas
- DISPLAY, to visualise the programmed parameters
- PROGRAM, to program the parameters
- TEST, to test the unit

All values are stored in a non-volatile memory and are maintained even in absence of power.
The unit is supplied with a set of default-programmed parameters that are listed on its user manual.

Operation

It protects against over/under voltage, over/under frequency and is programmable for independent tripping times. Each function has an associated indicator with 3 possible states::

- Blinking: threshold is exceeded
- ON: set timing is exceeded
- OFF: normal status

It is has 4 x 5A output contacts that can be program-associated to one or more functions.

Serial Communication

On request it can be provided with a serial RS485 (Modbus protocol) or optical fibre connection and with the required Windows based SW for programming and operation from a PC.

Main Technical Characteristics

- 400V Max. input voltage (for higher voltages an input voltage transformer on each phase is required)
- 2 frequency thresholds:
  ± Δ(0.05 to 9.99)Hz, in 0.01Hz steps
- 2 voltage thresholds:
  ± Δ(5 to 90)%, in 1% steps

The unit is mounted on a standard ELECTRON panel with 4 mm safety connectors.

Power Supply

- Type 1: 24 to 110 VAC, ± 20%
  24 to 125 VDC, ± 20%
- Type 2: 80 to 220 VAC, ± 20%
  90 to 250 VDC, ± 20%

Note

Together with the A2671 and A2673, under-over current and directional over-current and earth fault protection relays, it can form an integrated, comprehensive and sophisticated protection system.

A2673 - AC THREE PHASE PROGRAMMABLE AND PC CONNECTABLE DIRECTIONAL OVER CURRENT AND EARTH FAULT PROTECTION RELAY

This relay belongs to a series of modular, multifunction, programmable, microprocessor controlled protection relays designed for use in power distribution systems.

It is made in Italy and built according to the most advanced international standards.
Five pushbuttons and an 8-digit display allow easy, intuitive programming of the unit and 4 different modes of operation in order to set and measure the parameters:

- MEASURE, to access one of four display areas
- DISPLAY, to visualise the programmed parameters
- PROGRAM, to program the parameters
- TEST, to test the unit

All values are stored in a non-volatile memory and are maintained even in absence of power.
The unit is supplied with a set of default-programmed parameters that are listed on its user manual.

Operation

It protects against failures among phases and between phases and ground with directional detection. It is programmable for definite or inverse tripping times. Each function has an associated indicator with 3 possible states:

- Blinking: threshold is exceeded
- ON: set timing is exceeded
- OFF: normal status

It is has 4 x 5A, output contacts that can be program-associated to one or more functions.

Serial Communication

On request it can be provided with a serial RS485 (Modbus protocol) or optical fibre connection and with the required Windows based SW for programming and operation from a PC.

Main Technical Characteristics

- 1st over-current threshold 0.25-4A
- 2nd over-current threshold 0.5-40A
- 3rd over-current threshold 0.5-40A
- 1st earth fault threshold 0.02-0.4A
- 2nd earth fault threshold 0.02-4A
- 3rd earth fault threshold 0.02-4A
- 2 nominal input current ranges: 1 or 5A, selectable

The unit is mounted on a standard ELECTRON panel with 4 mm safety connectors.

Power Supply

- Type 1: 24 to 110 VAC, ± 20%
  24 to 125 VDC, ± 20%
- Type 2: 80 to 220 VAC, ± 20%
  90 to 250 VDC, ± 20%

Note

Together with the A2671 and A2672, under-over current – earth fault and under-over voltage protection relays, it can form an integrated, comprehensive and sophisticated protection system.

A2674 - THREE PHASE TRANSFORMER DIFFERENTIAL PROTECTION RELAY

This relay belongs to a series of modular, multifunction, programmable, microprocessor controlled protection relays designed for use in power distribution systems.

High quality instrument, built according to the most advanced international standards.
Five pushbuttons and an 8-digit display allow easy, intuitive programming of the unit and 4 different modes of operation in order to set and measure the parameters:

- MEASURE, to access one of four display areas
- DISPLAY, to visualize the programmed parameters
- PROGRAM, to program the parameters
- TEST, to test the unit

All values are stored in a non-volatile memory and are maintained even in absence of power.
The unit is supplied with a set of default-programmed parameters that are listed on its user manual.

Operation

It protects two-winding transformers against two or three phase internal faults, inter-winding faults, and ground faults in transformers with low impedance or solid grounded Neutral.
Eight LED's, normally off, provide visual information on the overall status.
4 output contacts can be program-associated to one or more functions.

Serial Communication

A serial RS485 port (Modbus protocol) allows communication and operation from a PC. A Windows based basic SW to control a single relay can be unloaded free from the Web. An advanced SW to control more relays can be quoted on request. An RS485/RS232 adapter can also be quoted on request.

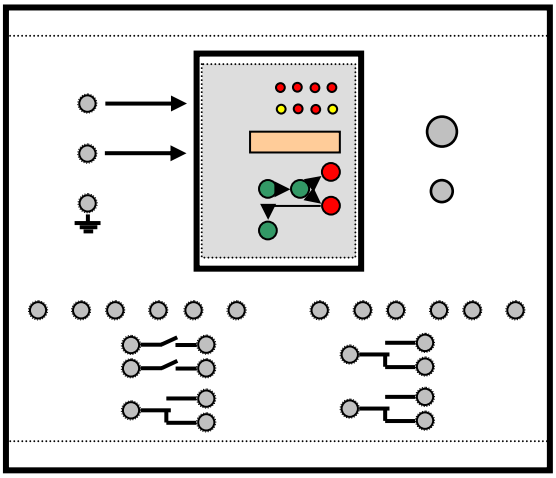
Main Technical Characteristics

- o Low and high set differential elements for each phase
- o Low set differential elements response time less than 2 cycles, high set less than 1 cycle
- o Programmable 2nd and 5th harmonic response suppress element
- o 16 cycles oscillographic records to document trip events; may also be triggered externally

The unit is mounted on a standard ELECTRON panel with 4 mm safety connectors.

Power Supply

- Type 1: 24 to 110 VAC, ± 20%
  24 to 125 VDC, ± 20%
- Type 2: 80 to 220 VAC, ± 20%
  90 to 250 VDC, ± 20%



A2680 - REACTIVE POWER CONTROLLER (RFH4/7)
(factory code A2620)
A2685 - CAPACITOR BANKS
(factory code A2625)

The **A2680** programmable Reactive Power Controller is used to improve the power factor of a balance loaded three phase line. It is composed of an automatic measurement unit to control three 3 Phase outputs that are activated in three successive steps to connect up to three external capacitor banks to the controlled line, until the power factor is brought within the limits set on the instrument.

Besides, it also provides readings of voltage, current, active and reactive powers and temperature. It may be capable of up to 7 steps; however, only 3 are activated on the A2680.

Additional steps require a separate unit with control circuits and must be ordered optionally.

Maximum phase current is 5A: if greater, an optional current transformer must be ordered.

The **A2685** Capacitor Banks shown below contains three groups of three Delta capacitors each, whose power must be specified at order time. Typically, each Delta is 200VAR for a total of 600VAR, but other ranges can be specified according to the line power of the planned application.

Technical Characteristics

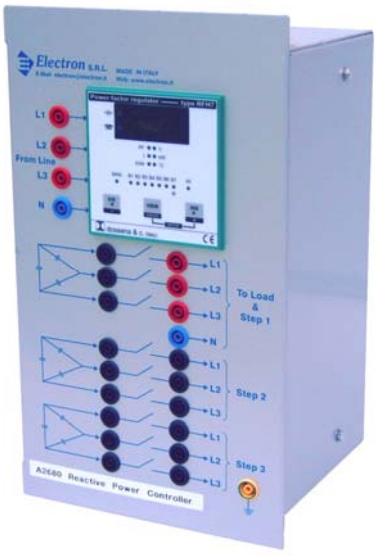
- One digital display on the front panel, LED indicators and three pushbuttons make it very user friendly: easy to program and to operate
- Automatic or manual operation
- Programmable working parameters
- LED indicator for Inductive/Capacitive load
- Digital power factor display
- LED Indication of connected capacitor banks
- For three phase 230/400V, 50Hz lines
- Power supplied from the three phase line
- Power consumption 5VA
- Current input max. 5A
- Response times: 5 to 120 sec. programmable
- Line current, active/reactive power display
- User Manual with clear description and application example

Ordering Information

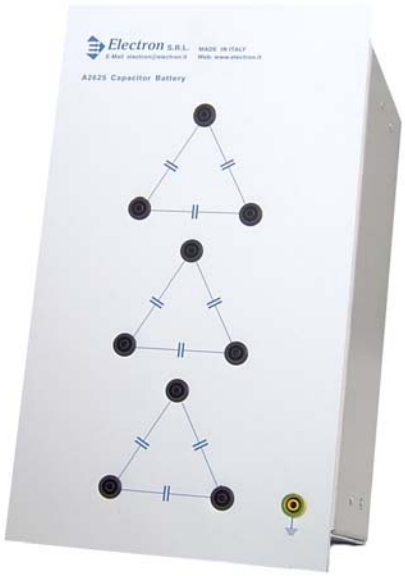
A2680 Reactive Power Controller (3 steps)
A2685 Capacitor Banks, 3 x 200VAR

Optional Features - Ask for quotation

A2680 Additional Steps, specify how many
A2680 Current Transformer, specify primary current range if grater than 5A
A2685 Specify power if different from nominal



A2680



A2685