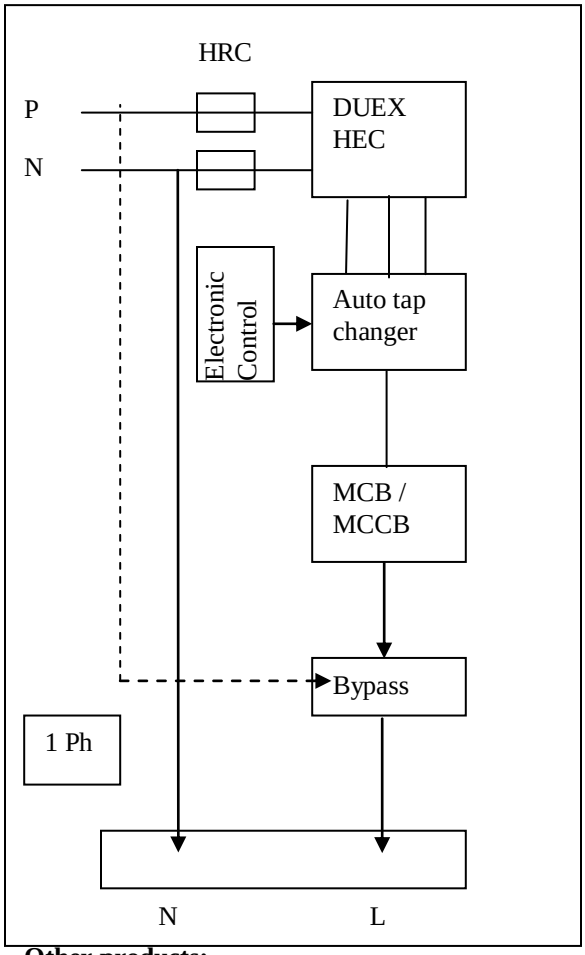
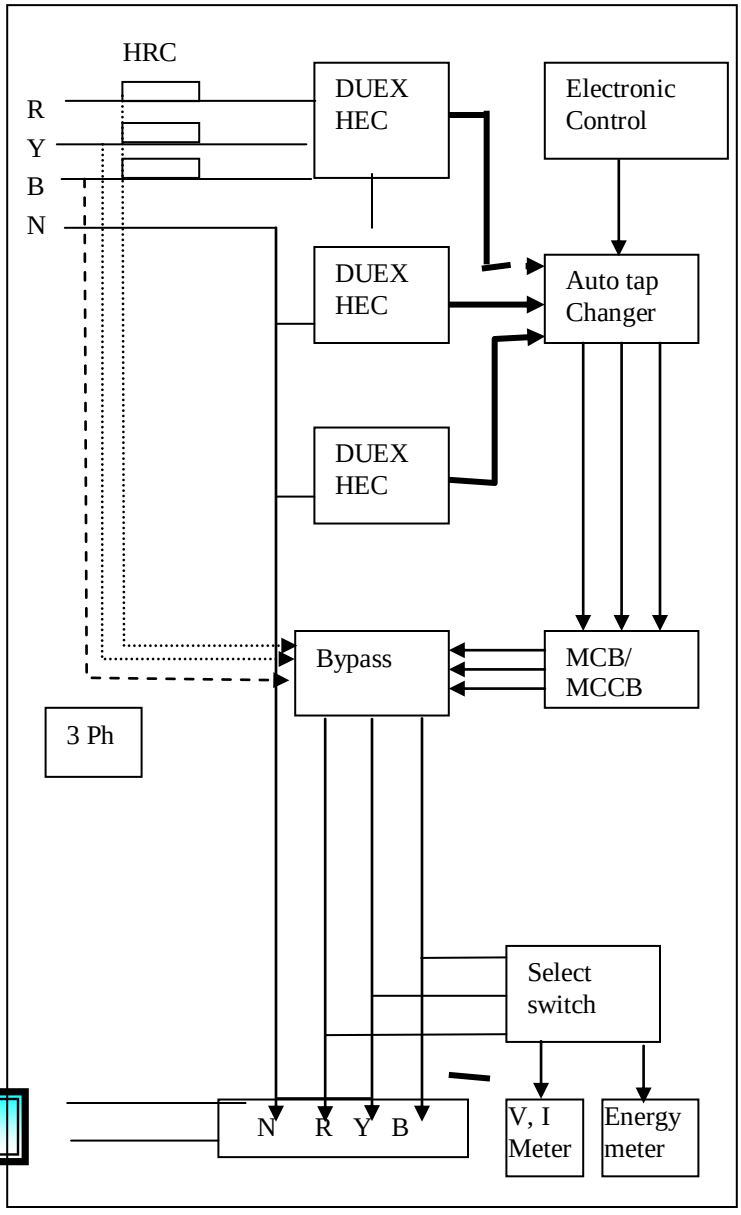
Capacity selection KVA

Single phase
2, 5, 7, 10, 12,15, 17, 20, 22, 25, 30, 35, 40, 45, 50
Three phase (star)
6, 15, 21, 30, 36, 45, 51, 60, 66, 75, 90, 105, 120, 135, 150, 210, 300, 360, 450

Schematic diagram for energy conservation system





Other products:

1. Soft starters
2. Ultrasonic cleaner

HEC: High Efficiency Coil

Accessories shown above are not part of standard system

DUEX Industrial Systems

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Energy Conservation System

Truth speaking company

DUEX®

Since 1996

ISO 9000 Company #

Foremost Indian company in Mag-Amp

12 MVA installations all over

Highlights

- Steady lumen™
- coil based rugged design
- upto 40 % energy saving
- avoids cabling & fitting change
- lamp life up by almost twice
- 15 years maintenance free life
- 100 % I st year IT depreciation
- 5 – 450 KVA, 1 or 3 phase
- higher design safety
- 100 % IT depreciation as per govt rule 5 IIIiiiEc, 1988-89 onwards

BILL

LIGHTING LOAD

Energy Saving System

SAVE ENERGY

to

Compete

the WORLD

Applications

- street lights
- industrial shop floors
- corporate offices
- railway platforms
- go-down, campus
- pet

ECS 25 – Economy Model

ECS 25A – Mag-Amp with SCENE control

ongoing

Entrepreneurship through innovation

>>>Company Profile

Started in 1996 with industrial cleaning systems viz. **Multistage ultrasonic and pressure jet system** with automation and later diversified to **lighting load energy saving system**.

Team of highly qualified engineers with experience over 8 – 10 years understand requirement from close angle to suggest you system with everlasting performance.

We operate from Thane (outskirts of Mumbai) and serving industry all over India.
Energy saving is today's keyword, it not only contributes in company profits but is in national interest too!
Keeping these factors in mind DUEX® came up with high efficiency coil based lighting load energy saving system.
You will be assured of its essence on going through this information.
100 % depreciation is admissible by government on energy saving devices in first year itself.

>>>Truth

To have fast delivery schedule DUEX® outsource some of the key components with strict quality checkups backed up by ISO 9000 norms. Turnkey project of MVA capacity for city is successfully completed by us in 4 month record time and bagged a prestigious award.

Lighting energy saving by Mag-Amp and Reactor are most common in US and European countries and becoming very popular in India due to its unique advantage of ignition for even low supply application. Though some manufacturer try achieving jerk less switching by means of contactor for Economy equivalent model using power resistors but is not truly technical.

As far as possible mixed load like 3 Ph Motor, Air conditioner is to be avoided in lighting circuit being harmonic inducing gadgets and deteriorate performance of luminaries, also do not give energy saving for motor part though current reduction is possible due to rise in power factor. Sometimes even watt reduction is possible but when readings over period are taken, units consumed are not altered due to cooling time variation in AC load. Please take note that current reduction is not power or energy reduction. (refer W=V*I*P.F.)

Various models are developed in technical know-how with IIT, Powai technologists and are proprietary designs of DUEX®.

It is studied that different kind of lamps behave differently at different power conditions and is non-linear in characteristic. Lumen is optimized by proper supply setting to comfortable level. Either voltage, current or power factor reduction achieves lighting energy saving if other parameters are not increased.

By thumbrule sodium and mercury vapour lamps save 1 % energy for 1 % optimization and tubelight save 0.6 % energy for same. Generally 20 to 35 % optimization is done in Mag-Amp or Rector systems depending of field parameters and 18 to 30 % optimization for Economy model. Depending on conditions either Econopmy or Mag-Amp or Reactor model is selected. (see table for % savings and lumen drop)

As no electronic power component like thyristor or transistor is used, DUEX models are rugged in functioning for decades of trouble free operation. Many organizations and corporates prefer coil based less fancy though bulkly system from reliability and easy maintenance point of view. Our standard manual bypass arrangement avoid shutdown and production loss though in very rare incidences clients had it beneficial.

>>>Principle

DUEX® ECS models conserve good chunk of energy (and money too!) for gas discharge lamps like tube light, sodium vapor lamp, mercury vapor lamp, metal halide lamps etc.

Above certain power, performance of gas discharge lamp saturates and saving is achieved by cutting excess energy consumed by load.

Because of this life of lighting device extends, choke burning reduces and thus maintenance and hazards are minimized. This is based on principle that, above saturation region (plateau) even if more power is pumped in luminaries, it gets dissipated in form of heat thereby even reducing its life. This saturation current is controlled by means of adding inductance. This also resist to abrupt change in current and absorbing momentary energy thus avoiding surge to load. These various design factors leads to energy saving as well as increase in life of lighting devices by almost twice.

Special purpose super grade imported laminations are used to build coils (HEC efficiency > 99 %) thereby achieving tremendous saving in tune of 20 – 30 %.

>>>Illustrative list of corporate clients

<Mahindra & Mahindra
<VIP
<Exide
<Colgate Palmolive
<Hero Honda
<Cadbury
<Hotel Panchratna
<Sterlite
<RPG
<NRB
=Brihanmumbai Municipal corporation
=Nagpur municipal corporation

for detailed client base pl ask our executive

>>>Techno-commercial benefits

- Payback period within 4 – 10 months depending on KVA rating
- 100 % income tax depreciation in first year as per govt rule 5 IIIiiiEc, 1988-89 onwards
- Upto 30 % saving depending on power supply pressure and kind of lamps
- Prolongs life of lighting device and switch gear by almost twice
- Over 15 years of maintenance free life
- Design safety factor of better than 1.2 for coils and 1.5 for switchgears is unique to Duex system thereby sustaining adverse power conditions.

⁂ Economy [ECS25]

- Very high efficiency system
- Upto 20 % saving in electricity bill
- Basic operational and safety features
- Rugged performance

- No maintenance
- High operating range
- Prolongs life of luminaries

⁂ **Mag-Amp [ECS25A]**

- Flux induction unsaturated coil based
- Avoids manual intervention required for ignition
- Upto 30 % saving in electricity bill
- Electronic control card for reliable operation
- Advanced operational features
- Auto ignition during power ON and manual ignition
- Smooth changeover from ignition to optimize mode
- No moving parts, motor-less, contactor-less
- 3 ph independent user setting

⁂ **Reactor [ECS25B]**

- Pioneer and only in this technological application
- Provides steady intensity of luminaries
- Wider operating range
- Contactor based, no power resistors
- Electronic control for reliable operation
- Auto changeover from ignition to optimize mode

>>>**Optional specifications**

- Energy meter
- Ammeter
- MCB/MCCB
- SFU

Specific requirement

- Panel IP 65
- Rating: 15 KVA, 7.5 KVA
- Supply Type: 3 Phase, 4 Wire
- Recommended Voltage: 415(380 to 450) VLL, 3 Phase
- Mode of operation: Continuous
- Ambient temperature: -3 to 45 ^{0}C
- Usage: Outdoor
- Standards: IS 13947/ IEC 60947 (For Major Components Used)
- Insulation: 2.5 KV Line to Earth
- Protection: Short Circuit and Overload Protection through MCB/MCCB
- Phase Indication: LED Load status Monitor Blink on Over/Under Voltage.
- Cable Terminations: Bottom Entry Gland Plate, Heavy Duty Terminal, Copper Earthing.
- Mounting: Floor/Trench

>>>**Formula for calculating payback period**

Payback period (in months) =
(Price in Rs * 100) / (Saving in % * 'ON' hrs per day * Number of days in month * Tariff in Rs * kW)

kVA = kW / 0.6

Consider p.f. 0.6; even if centralized capacitor bank is connected & p.f. maintained near 1. This is to be considered while deciding system capacity because a) Since bank is away from lighting load, along the line, p.f. drops to 0.5-0.6 b) In case of bank failure currents goes up

Why to save energy

1. Rising tariff of power bills
2. Energy crisis anticipated due to present situation
3. Energy conservation Act,2001 as passed by Lok Sabha on 17 th August 2001/Bill No 21-Cof 2000
4. To increase PBT by energy cost cutting method
5. To save resources
6. To raise level of understanding among professionals
7. To reduce waste and pollution

Economy	[ECS 25]
Mag-Amp	[ECS 25A]
Reactor	[ECS 25B]

Innovation is key to future, continuous improvements for betterment of industry and humankind is soul to our R & D department.

Lumen level

It is studied by DUEX® that when power to luminary is varied its luminosity changes as per manufacturer's specifications. Typical lamp specs are as follows,

Philips HPMV	200 – 250 VAC
CEMA HPMV	220 – 250 VAC
HPSV	200 – 250 VAC
ML	200 – 240 VAC
Tube light	190 – 250 VAC (not mentioned)
Choke	220, 240 VAC taps

It is evident that lamp manufacturer propose for lower power usage for increased lamp life at optimum lumen level.

Mag-Amp [ECS 25A]

ISO 9000 company

After indepth study of industries, power conditions and light characteristics DUEX® developed and successfully commissioned several systems, which provides steady light intensity through out different timings and periods under varying power conditions.

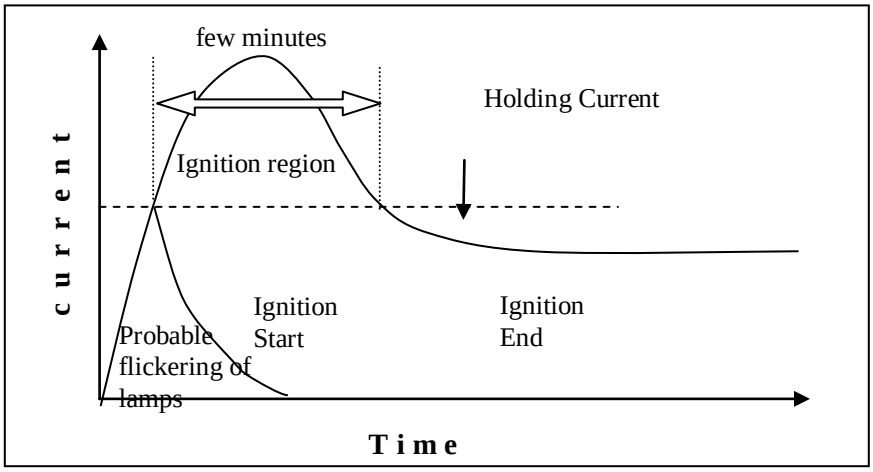
Conventional systems like P-20, ES-25 or Electromizer do have reasonable success in energy saving but at the cost of much reduced and varying light intensity as well varying load current.

As per international norms QC, production, office, pathways, street-light are classified in context to lumen requirement. It happens that because of power conditions lumen varies drastically and even sometimes crosses specified level, either causing uncomfortable lux or excess power consumption.

DUEX®'s Mag-Amp [ECS 30] model rules out all these possibilities and control the saturation current with dynamic saving [record saving 33 %]. Under such conditions conventional models behave fairly well, but Steady Lumen™ gives you ultimate performance. With never before user friendly 'ignition control' soft power start is applied to ignite the gas discharge lamps.

Ignition control:

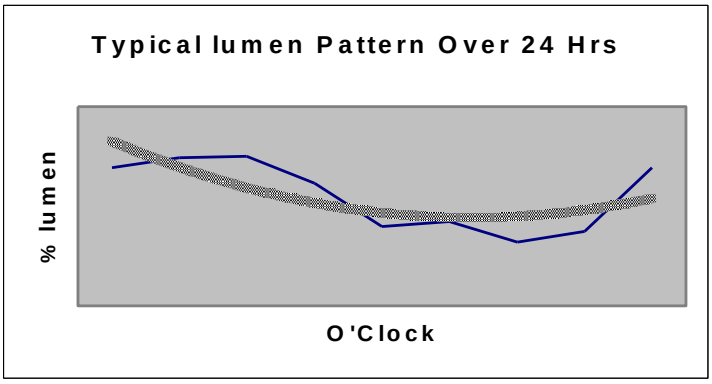
Gas discharge lamps need higher excitation power for switching ON and later normal operating current can be optimized to much lower side. Conventional systems take into consideration only normal current and there by failing to ignite the lamps in most of the cases. Field study made by DUEX® has led us in designing Ignition Control to break up the technical barrier.

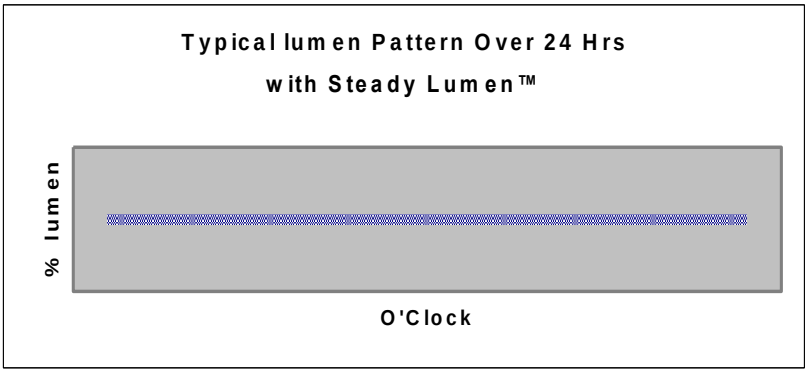


Economy Model [ECS 25]

EYE is evolved so perfectly over the period by nature that same eye without any accessories can see in gloomy ambient as well in bright sunny light. Such a wide characteristic is a way ahead for today's science. Clouds at 6-8 kms height affect lumen level; still our eye makes proper adjustment. It is scientifically proved that eye takes hardly 4 secs to adjust from 10,000 to 50 lumen. Lets have a glance at graph 1, it is clearly evident that factors like position of sun in sky, weather condition, seasons, wall & ceiling color, humidity, gases, power variation, life of luminaries and their make do contribute to lumen variation. But…do not introduce any kind of scientifically approached systematic energy saving. This is where DUEX®'s Economy Model plays vital role to save energy and increase profit-the ultimate of any business.

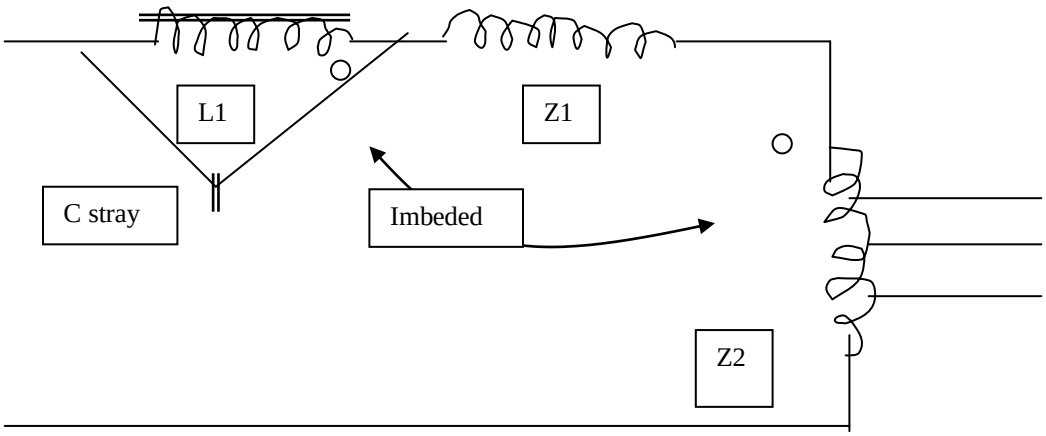
DUEX® adopted star distribution system compared to delta because of its virtue of redundancy.





What exactly happens in DUEX® HEC:

Simulated electrical diagram of high efficiency



Thought of the future:

Why do we need to change in energy use and production

The main problem isn't that we use energy, but how we produce and consume energy resources. As long as we continue to cover our energy needs primarily by combustion of fossils, fuels or nuclear reactions, we are going to have the problems, the environmental impact, social and sustainability problems. What we really need are energy sources that will last forever and can be used without pollution to environment.

Our goal:

01. To help you save resources
02. To raise the level of understanding of how it really works
03. To raise level of understanding among professionals
04. To reduce waste and pollution
05. To reduce over sizing and cost

Electric lighting load adds to heat to space that must be removed by Air Conditioning. Turn off unnecessary lights or use heat-reducing devices as 'lighting energy saver'

Internal cable and insulation-

All internal conductors utilized are stranded copper wire, insulation is fire retardant rated 105^{O}cent.

How to select model*:
Model selection depends on various parameters like supply variation band, minimum supply, maximum supply, type of lamps, commercial etc.
Broadly it is identified by DUEX to have Economy model fort areas where supply does not fall below 225 VAC 1 Ph. For supply going down to 210 VAC Mag-Amp model is recommended. For the same range form commercial point of view Reactor model is suggested.
For steady lumen (from supply angle and atmospheric variation is not considered)

*(Above recommendations are broadly classified and need not necessarily final selection)

Energy saving:
Please note that lighting energy saving system is optimization between luminosity and energy saving. It is left to user to select tap or output as per his/her own requirement. Following results are average for different make and life of lamps and is actual field data compiled over years. In Economy and Reactor based models Tap1, Tap2 and Tap3 are standard taps. User to note that any three taps in forward sequence are available and requested to mention the same in P.O. since it is one time factory design and can not be altered at site.

Input 1 Ph	240 VAC	240 VAC	240 VAC	240 VAC	240 VAC
Output	Max	Tap 3	Tap 2	Tap 1	Min
Lumen drop % (HPMV/HPSV)	8-11	11-16	15-19	20-25	22-28
Lumen drop % (Tube light)	5-8	8-12	11-16	14-20	17-20
Saving %*	**11**	**16**	**21**	**27**	**34**

*Saving indicated is for HPMV/HPSV lamps, for tube light you will get ½ to ¾ th saving
In case of Mag-Amp output is settable from input-36 V to input-18 V. If output equal to input-36 V is selected (factory setting), then on ignition input-18 V gets applied for around 2 minutes.

FAQ…

How energy saving is achieved for lighting load?

Lighting load is mainly with gas discharge lamps like HPSV, HPMV, Tube-light, CFL etc. These loads have non-linear characteristics. DUEX® operates at knee point of plateau and this is how energy saving is achievable. This makes less power to flow to lighting load at reduced load without significantly dropping lumen.

How much maximum saving is achievable?

% Energy saving varies from device to device and is maximum for sodium and mercury lamps, somewhere up to 40 % with maximum differential. For tube light with coil give around 20-25 % energy saving for same differential and last comes CFL lams and Tubes with electronic ballast, where 10-12 % energy saving is seen. Saving will vary with i/p-o/p differential; also one can't let o/p drop much down to have maximum saving, since this will cause lamp flickering-See Mag-Amp with **SCENE** control.

What other parameters will it affect?

Dropping down o/p power much down or increasing i/p-o/p differential will cause lamp flickering thereby irritation to workers and loss in production.

What are different models available?

1. Economy 2. Mag-Amp The former is open loop type and is basic model without and control. The later is closed loop type and is advanced model with SCENE control.

Where to choose Economy and where to choose Mag-Amp®?

Some mechanism is required to maintain power constant. In Economy such thing is absent and preferred where i/p supply is fairly constant is above 225 V~ at all times. Lumen does vary with this model due to feedback absence. But steady supply conditions are not always expected due to varying power distribution and load demand. Mag-Amp is very good to overcome these difficulties and best accepted by industry. Mag-Amp is non-mechanical coil based control and is most reliable.

What is SCENE control?

Due to steady lumen condition with feedback action light lumen remains steady throughout working condition. We do not need same lumen all the time and can be altered with SCENE control to have varying conditions and thus achieving optimum energy saving. Say during lunch break and shift change less lumen will do and also gives higher energy saving. Thus by microprocessor based user settable control fine-tuning can be done and more energy saving is achieved. Per day 7 time regions are settable for variable steady lumen level.

>>>What it Includes? (Specifications)

Toroidal coils (3) **Independent three phase control**
Incremental control>15 years life
Triplet resonance>15 years life
S.C.E.N.E. card with 7 time zone program card and digital real time display (1) > lifetime warranty
Feedback card (1) > lifetime warranty
Motor control card (1) > lifetime warranty
Bypass s/w (1) > 15 years life
HRC fuses (3)
MCCB at incomer (1)
Energy meter Enercon (1)
Voltmeter Analog (1), Vss (1)
Electronic Overload, over-voltage and under-voltage protection (1)
Analog / digital mode s/w (1)
Siemens/light gray CRCA powder coated panel (1)
Gland plate for bottom cable entry (1)
Instruction manual (1)