Automatic Electric Ltd.

Index

Power System Division

BUREAU VERITAS Certification

AUTOMATIC ELECTRIC LIMITED

AE

INSTRUMENT DIVISION: 366/367, SURAIYYA ROAD, NEAR SURAIYYA BUNGLOW, VALVAN, LONAVALA – 410 401, MAHARASHTRA, INDIA.
POWER SYSTEM DIVISION: 96/98, LONAVALA INDUSTRIAL ESTATE, NANGARGAON, LONAVALA – 410 401, MAHARASHTRA, INDIA.
CT/PT DIVISION: B-73, MIDC, ADDITIONAL INDUSTRIAL ESTATE, ANANDNAGAR, AMBARNATH (EAST), DIST.: THANE – 421 501, MAHARASHTRA, INDIA.

Bureau Veritas Certification certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standard detailed below

Standard

ISO 9001:2008

Scope of certification

INSTRUMENT DIVISION
Design, Manufacture, Supply and Servicing of Direct acting Indicating Analogue and Digital measuring Instruments, Their Accessories with Electrical Transducers, Digital Multi function meters, Energy Meters and Programmable Multi function Transducers.

POWER SYSTEM DIVISION
Design, Manufacture, Supply and Servicing of Dimmerstat up to 1600 Amps, Low Tension Transformers up to 1200 KVA, Resin cast Transformers up to 200 KVA, Energy Saving Units up to 250 KVA, AC Voltage Stabilizers up to 3500 KVA, Rectifiers up to 600 VDC / 10000 Amps./300 KVA Battery Chargers up to 220 VDC / 600 Amp / 200 KVA, Current Injection Test sets up to 15000 Amp, Ultra Isolation Transformers, Lighting Transformers, Motor And Transformer Testing Bench up to 800 V/ 1600 Amp and AC Step Synchronous Motors up to Torque 40Kg.Cm.

INSTRUMENT TRANSFORMER (CT/PT) DIVISION
Design, Manufacture, Supply and Servicing of Low Tension tape wound and Resin cast Current Transformers up to 6000 Amp / 15 VA, Low Tension tape wound and Resin cast Potential Transformers, High Tension Resin cast & Oil Cooled Current And Potential Transformers (HT CT/PT) up to 132 KV And High Voltage Testers from 2.5 to 200 KV.

Certification cycle start date: **20 February 2013**
Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: **19 February 2016**
Original certification date: **16 May 1997**

Certificate No. IND13.6097U Version : 1 Revision date: **19 February 2013**

Certification Authority
RAMESH KOREGAVE

UKAS MANAGEMENT SYSTEMS 008

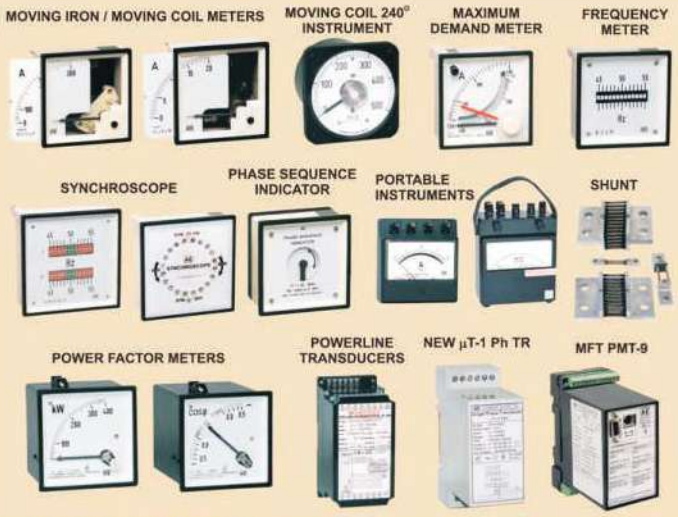
Certification body address: *Brandon House, 180 Borough High Street, London SE1 1LB, United Kingdom.*
Local office: *"Marwah Centre" 6th Floor, Krishanlal Marwah Marg, Opp. Arya Industrial Estate, Off Saki Vihar Road, Andheri (East), Mumbai – 400 072, India.*

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization.
To check this certificate validity please call +91 22 6695 6300.

AE Automatic Electric Ltd.

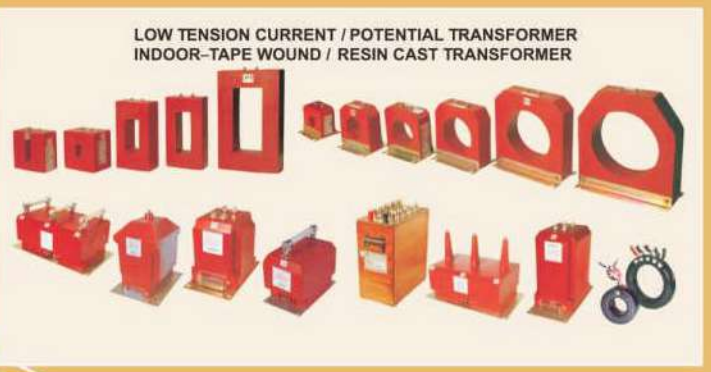
Product Range

Electrical Measuring Instruments



Introducing New Range

Instrument Transformer Division



Dimmerstat®

Power System Division

0.75 to 1600 Amps

Continuously Variable Voltage Auto-Transformer

DESCRIPTION

'Dimmerstat' is registered trademark of AE for continuously variable voltage auto-transformer. it is the most effective device for stepless, breakless & continuous control of AC voltage & therefore for various parameters, dependent on AC voltage.

The basic Dimmerstat is meant for operation from a nominal input voltage of 240V AC & can give output voltage anywhere between 0 to 240V or 0 to 270V AC by simple transformer action. Three such Dimmerstat connected electrically in star and mechanically in tandem, become suitable for operation from a nominal input voltage of 415V 3Ph AC and can give output anywhere between 0 to 415V or 0 to 470V.

Resin moulded Dimmerstat is basically a variable Voltage Auto-Transformer which is partly or fully Moulded in Reinforced Polyester Resin. This has adjustable spindles which allows easy assembling of flush, table or Motorized Type in single or three phase models. These models are designed upto 120% continuous load.

FEATURES

- Simple, rugged construction.
- Coils made from high grade CRGO Silicon Steel & 99.9% pure Electrolytic copper.
- Output voltage variation is smooth, continuous, breakless & linearly proportional to angular rotation.
- High efficiency.
- Negligible waveform & power factor distortion.
- Excellent short time overload capacity.
- Remote operation possible by motorization.
- Wide range of current ratings.
- High quality carbon brush used for current collection.

ELECTRICAL SPECIFICATIONS

- MODEL : a) Flush Open Manual (Air Cooled) — F
  b) Portable Enclosed Manual (Air Cooled) — P
  c) In Tank Manual (Oil Cooled) — T
  'F', 'P', 'T' suffixed by 'M' means motor operated models.
- OPERATING VOLTAGE : For Single Phase – 240V AC, 50 - 60 Hz.1 Ph
  For Three Phase – 415V AC, 50 - 60 Hz.3 Ph - 4wire.
- CURRENT RATINGS : For Oil Cooled models, maximum current & continuous current are one & the same.
  For Air Cooled models, the ratings are as shown below

RESIN-CAST

Maximum Current	0.7	2	4	6	8	10	15	20	24	28	35	Amp
Continuous Current	0.6	1.8	3.8	5.4	6.5	9	11.5	16	22	22	32	Amp

- OPERATING TEMP. : 0° - 50°C
- INSULATION RESISTANCE : >5MΩ at 500V DC.
- DIELECTRIC TEST : 2.5kV RMS for 1 minute.
- STORAGE TEMP. : -9°C to 70°C
- HUMIDITY : Upto 95% RH
- CONFORMS TO : I.S. 5142.

Notes: 1) As output voltage is continuously variable, Dimmerstats are rated in terms of current that can be drawn from the output.
2) Oil should be Transformer Oil conforming to IS 335, IEC 296.

Dimmerstat®

Power System Division

0.75 to 1600 Amps

Continuously Variable Voltage Auto-Transformer

MECHANICAL CONSTRUCTION

Single phase Dimmerstats are available in 3 types.

- Portable (P) with sheet steel enclosure for floor / table mounting.
- Flush (F) open type construction. Suitable for panel mounting.
- Tank (T) immersed in oil in sheet steel tank with roller mounting.

Three phase Dimmerstat are usually ganged assemblies of 3 coils and available in all types; P.F.T. Higher rating Dimmerstat (above 200 Amps) use 2 or more coils in parallel with current balancing arrangements. Motorised Dimmerstat uses 240V A C Step - Syn Motor having 60 rpm speed at 50Hz with proper gearing higher torque at lower speed can be achieved. Standard gear ratios used provide sweep time of 8, 15, 30 45, 60, 120 secs.

APPLICATIONS

- Auditorium, Hotels, Conference Halls, Exhibitions, Laboratories etc.,
- AC Voltage Stabilizers, Rectifiers, Battery Chargers.
- Temperature control of Ovens, Furnaces.
- Testing of Instruments, Relays, Circuit Breakers etc.
- Welding, Electro-plating, Anodizing etc.
- Colleges & Universities.

Ordering information

(as per code specified below)

1st block	Output current rating amps	0.7, 2, 4, 6, 8,10, 15, 20, 24, 28, 35, 40, 50, 60, 75, 100, 125, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1600A
2nd block	Dimmerstat (D)	Continuously variable voltage auto transformer.
3rd block	No. of coils	1, 2, 3, 4, 6, 9, 12, 15, 30, 45
4th block	Type of construction	F = Flush, back of panel mounting, air cooled open. P = Portable, floor, table mounting, air cooled with enclosure. T = In tank, immersed in oil.
5th block	Provided with motor drive (M)	"Step-syn" 230V 1Ph AC 50Hz. 60rpm motor having instantaneous start-stop-reverse characteristics.
6th block	Approx. time in secs. for full rotation sweep time.	5, 8, 15, 30, 45, 60, 120 (As per standard gear ratios available)

e.g. | 75 | D | 3 | T | M | 15 | 75 A Dimmerstat with 3 coils (Three phase) in oil-cooled tank construction with motor drive having 15sec. sweep.

e.g. | 8 | D | 1 | P | 8A Dimmerstat with 1 coil (single phase). Portable type & suitable for manual operation (no motorisation)

Similarly, other Dimmerstats can be configured & ordered.

Dimmerstat®

Power System Division

0.75 to 1600 Amps

INTRODUCTION

Dimmerstat is the Registered Trade Mark of AE for the continuously variable voltage Auto Transformer, It is the most useful and effective device for stepless, breakless and continuous control of a.c. voltage. This widely known and highly acclaimed product, introduced more than 65 years ago,is an ideal controlling device for numerous applications in laboratories and in industrial & commercial fields.

The basic Dimmerstat is meant for operation of a nominal voltage of 240V A.C. and can give output voltage anywhere between 0 to 240V or upto 270V by a simple transformer action. three such Dimmerstats when connected electrically in star, and mechanically in tandem, become suitable for operation off 415V 3 Phase A.C. supply and to give output from zero to 415V or upto 470V.

SPECIAL FEATURES

Dimmerstat is the best device to obtain a continuously variable output voltage from a fixed a.c. voltage source. This is clearly evident from various special features and operating advantages, given below:

- Simple & rugged in construction - Therefore has long life, is relatively cheaper, noiseless in operation, compact and easy to understand, maintain and repair.
- Good regulation - Voltage drop on load is low, due to low resistance of conductor and low leakage flux of toroidal core.
- Output voltage variation on no-load and even on load is effortless, smooth, continuous, breakless and linearly proportional to angular rotation.
- High efficiency - No load losses and load losses are low.
- Negligible waveform and power factor distortion due to simple transformer action.
- Excellent short time overload capacity.
- Easy for remote operation with the help of motor drive.
- Wide range of models.

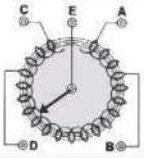
APPLICATIONS

- Dimmerstat, because of its unique characteristics and features find a very wide field of applications. A few of them are-
- Light control in auditoriums, hotels, restaurants, theatre stages, photo-studios, verandahs, lobbies, conference halls, cinema houses and even in homes.
- Voltage and current control in experimental and development work in laboratories and R & D Depts,
- Testing and calibration of indicating instruments.
- Current control for testing relays, current transformers, circuit breakers etc.
- Temperature control in ovens furnaces, moulding processes etc.
- Testing of electrical and electronic equipments for undervoltage and overvoltage performance.
- Breakdown testing of insulation.
- Control of D.C. Voltage in electrochemical processes, such as electroplating, battery plate forming, anodizing, metal refining hydrogenation, cathodic protection etc.
- Starting of A.C. motors.
- Speed control of D.C. motors in textile, plastic and paper industries and other extrusion processes.
- Servo Controlled A.C. Voltage Stabilizers and D.C. Power Supply Equipments.
- Phase Shiffing Transfromers.

For other applications and choice of models, where Dimmerstat is the best solution, consultancy and guidance can be provided by AE.

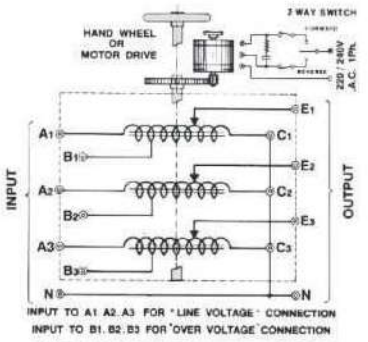
RATING AND SPECIFICATIONS

All single phase Dimmerstats and rated for 240V A.C 50/60Hz. single phase supply and the three phase models for 415V A.C. 50/60Hz. three phase 4 Wire supply.



	FLUSH TYPE	PORTABLE TYPE
INPUT FOR 'LINE VOLTAGE'	A-C.	C-A
INPUT FOR 'OVER VOLTAGE'	A-D	C-B
OUTPUT	A-E	C-E

CIRCUIT DIAGRAM FOR 1 PH DIMMERSTAT



CIRCUIT DIAGRAM FOR 3PH DIMMERSTAT AND MOTOR DRIVE

The output voltage can be varied smoothly over two ranges (i) from zero to full supply voltage (line voltage connection) or (ii) from zero to approx. 12% higher than the supply voltage (Over voltage Connection).

As the output voltage ts continuously variable, Dimmerstats cannot be rated in terms of KVA but are rated in terms of current that can be drawn from the output. The rating assigned to a Dimmerstat generally indicates the max. output current that can be drawn for a short time and at an output voltage of zero to near about the supply voltage value. The current that can be drawn from the output continuously and at any voltage, over the entire range, is generally lower in air cooled models and for all oil cooled models both the ratings are the same. The table below gives the two corresponding ratings for air cooled models.

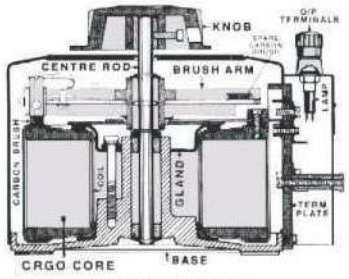
CURRENT RATINGS OF AIR COOLED MODELS											
Nominal Max. Current	0.7	2	4	6	8	10	15	20	24	28	35
Cont. Current	0.6	1.8	2.8	5.4	6.5	9	11.5	16	22	22	32

Dimmerstats are suitable for indoor use in a maximum ambient temperature of 45°C they can also work at higher ambient temperature though at reduced output current rating. Dimmerstats can also be supplied for non-standard input and/or output voltages.

TYPES AND CONSTRUCTION

Basically Dimmerstat consists of a single layer of a high conductivity insulated copper wire, wound over an insulated toroidal core made of high grade C.R.G.O. silicon steel. The insulation on a particular portion of the wound coil is removed by precise grinding to form a commutator surface

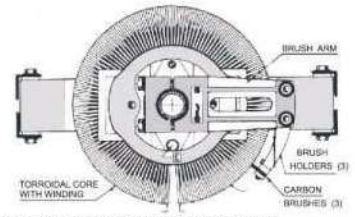
over which the carbon brush traverse. The commutator surface is treated with a special precious metal plating process.



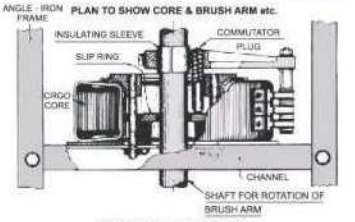
SECTIONAL VIEW

In case of models upto 28amp. ratings, the commutator surface is formed on the top side of coil. For higher ratings, in order to have larger contact area, the commutator is formed on the outer axial surface of the coil. Multiple brushes in parallel are employed to cover the full width of the area. Models of rating of 40 Amps. and above are made only in oil cooled construction.

CONSTRUCTIONAL DETAILS OF LARGE OIL COOLED DIMMERSTAT (ONE ELEMENT)



PLAN TO SHOW CORE & BRUSH ARM etc.



SECTIONAL ELEVATION

Single phase Dimmerstats are generally supplied in two types of construction, one is a portable (type P) with sheet metal enclosure for mounting on table, floor or wall. For mounting them flush or back of panel, or inside a cubicle, they are supplied without enclosure (type F). For better cooling, or continuous use at a fixed or nearabout fixed voltage, or even for protection against atmospheric effects, Dimmerstats are immersed in oil in a sheet steel tank.

Ganged assembles using 3 coils are used for 3 Phase Dimmestat. these are also made in all types i.e. P.F. & T.

For higher ratings (above 200 Amps) two or three coils are used in parallel with load balancing arrangments. Against Specific requirements, Dimmerstats can also be supplied with 2 coils in series for operation of two phases or for independent outputs.

the details of standard types of Dimmerstats are given in the succeeding pages. All dimensions weights etc. are only approximate. For non-standard requirements, special offers can be made.

MOTOR DRIVE

Dimmerstats can be provided with a motor drive for the purpose of remote operation or automatic operation. the type of motor used is specially made for this application, it is a 240V A.C. synchronous stepper motor with a speed of 60 RPM at 50Hz. it can instantly start, reverse and stop without overrun. Gears between the motor and the Dimmerstat shaft are used to get a lower speed and hightertorque. the approximate time required for the full sweep of the brush is required to be specified, such as 5 / 8 /15 / 30 / 45 / 60 / 120 Secs.

CODING SYSTEM

A special coding system is adopted to identify the type and rating of the Dimmerstat. the first figure indicates the normal current rating, this is followed by latter 'D' denoting that is is a Dimmerstat. The third figure gives the no. of coils used in the assembly. the type of construction as explained earlier is indicated by the fourth letter. The code for manually operated Dimmerstat ends here, if the Dimmerstat is provided with a motor drive, the code is suffixed by letter 'M' followed by the figure that indicates the approx. time in seconds for full sweep of the brush arm.

For instance, Type 8D-1P indicates that is a 8 amps Dimmerstate with one coil (suitable for single phase), with portable sheet metal enclosure and suitable for manual operation. Similarly 75D-3TM15 means a 75 Amps. Dimmerstat with 3 coils (suitable for 3 Phase supply) in oil cooled construction, provided with motor drive having full sweep time of approx. 15 seconds.

MAINTENANCE

Even though Dimmerstats has moving and rotating parts, they do not require any routine maintenance. The bearings are self lubricating and brushes are self aligning to take care of the wear. it is advised to clean the commutator surface periodically with clean cloth or with a smooth polish paper to get rid of the carbon deposit and to ensure that all turns are even and also to check free movement of the carbon brush inside the holder under spring pressure. All Dimmerstats above 2 amps rating are provided with a spare carbon brush inside. This will be handy in the event of a breakage of the brush. In case of oil for its electrical insulation level, normally once in a year, and, if necessary, the oil should be adequately filtered.

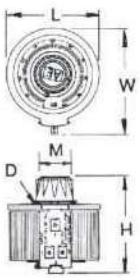
When operated with its rated capacity, Dimmerstat has long life, comparable to that of a fixed ration conventional transformer for protection, it is advised to use a fast acting fuse at the output and a show acting fuse at the input, so that proper protection can be provided without false blowing of fuse on account of switching surges.

Dimmerstat

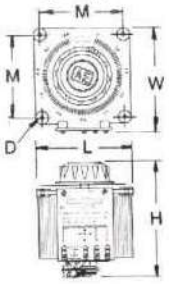
Power System Division

0.75 to 1600 Amps

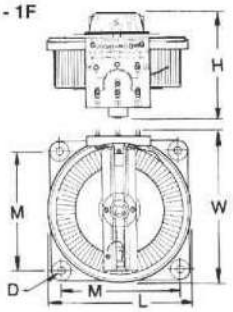
0.7D - 1F



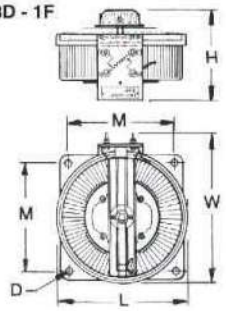
2D - 1F



8D - 1F



28D - 1F



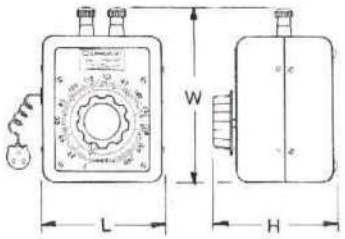
1 PHASE FLUSH MANUAL (AIR COOLED) 1 F											
Current Rating	0.7	2	4	6	8	10	15	20	24	28	35
L (mm)	84	109	175	175	175	192	220	250	250	305	310
W (mm)	98	120	190	190	190	210	240	290	290	350	325
H (mm)	87	127	130	153	153	153	180	205	205	205	200
M (mm)	28	92	146	146	146	154	178	204	204	238	250
D (mm)	5.0	6.5	11	11	11	11	11	13	13	13	13
Wt (Kg)	1.1	3.0	5.8	7.4	7.5	9.8	13.8	17.3	18	21	22

0.7D - 1F

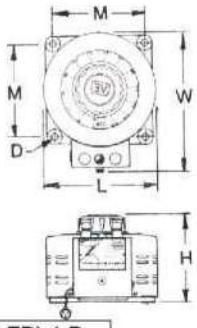
2D - 1F

8D - 1F

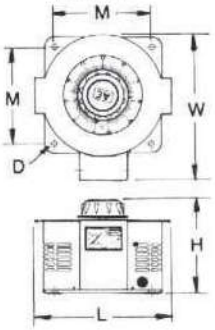
2D - 1P



8D - 1P



28D - 1P



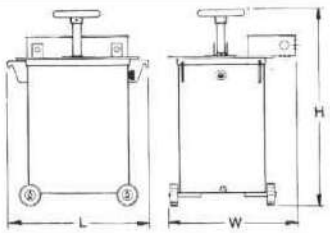
8D - 1P

1 PHASE PORTABLE MANUAL (AIR COOLED) 1 P										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	134	178	178	178	195	227	285	285	360	360
W (mm)	186	220	220	220	235	265	305	305	380	435
H (mm)	140	140	155	155	160	185	200	200	215	480
M (mm)	-	146	146	146	154	176	204	204	238	250
D (mm)	-	11	11	11	11	11	13	13	13	13
Wt (Kg)	3.8	8.2	8.5	8.5	10	24.8	19	19.7	24	41

2D - 1P

28D - 1P

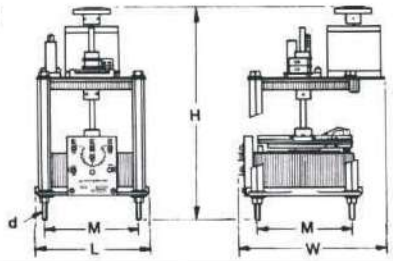
60D - 1T



60D - 1T

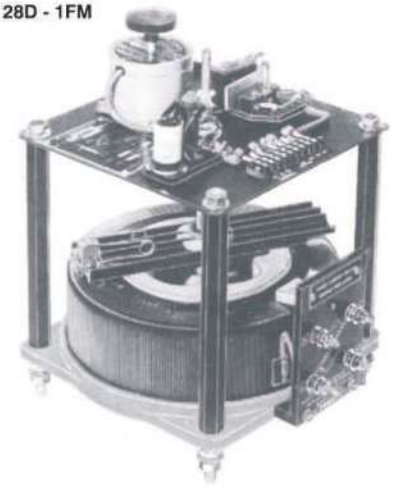
1 PHASE MANUAL (OIL COOLED) -1 T									2T			3 T	
Current Rating	40	50	60	75	100	125	150	200	250	300	400	500	600
L (mm)	590	720	720	835	835	835	950	1150	830	1155	1255	1155	1255
W (mm)	610	610	610	710	840	840	865	1065	1135	1190	1290	1190	1290
H (mm)	680	945	945	830	1115	1115	1165	1165	1160	1330	1330	1630	1630
Wt. (Kg)	80	100	100	125	205	210	230	265	350	450	480	610	650
OIL (Ltrs)	55	90	100	120	180	180	195	210	270	325	350	440	460

10D - 1FM

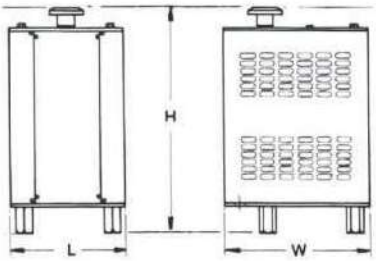


1 PHASE FLUSH MOTORISED (AIR COOLED) 1 FM										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	155	175	175	175	192	220	250	250	305	310
W (mm)	210	230	230	230	230	250	295	295	350	325
H (mm)	295	315	315	315	315	350	405	405	410	340
M (mm)	92	146	146	146	154	176	204	204	238	250
d (mm)	6	10	10	10	10	10	12	12	12	12
Wt (Kg)	5.6	8.3	10	10.1	12.4	17	21.4	22.1	25.5	26.5

28D - 1FM



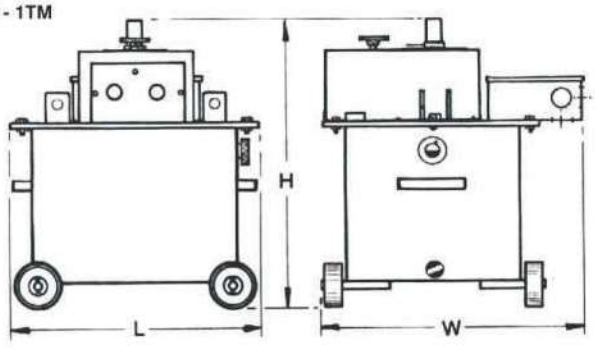
4D - 1PM



1 PHASE PORTABLE MOTORISED (AIR COOLED) 1 PM										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	190	190	190	190	210	240	305	305	380	360
W (mm)	240	240	240	240	265	305	375	375	435	460
H (mm)	350	350	350	350	350	375	465	465	475	480
Wt (Kg)	11.5	14.6	16.5	16.6	19	25	35	36	44.6	45.6

4D - 1PM

40D - 1TM



40D - 1TM

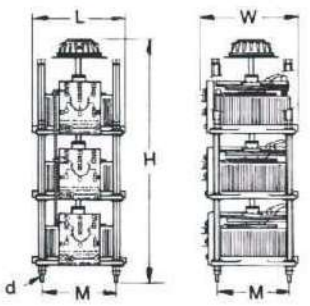
1 PHASE MOTORISED (OIL COOLED) 1 TM									2 TM			3 TM	
Current Rating	40	50	60	75	100	125	150	200	250	300	400	500	600
L (mm)	590	720	720	835	835	835	950	1150	830	1155	1255	1155	1255
W (mm)	610	610	610	710	840	840	865	1065	1135	1190	1290	1190	1290
H (mm)	680	935	935	830	1100	1100	1150	1150	1140	1315	1315	1615	1615
Wt. (Kg)	90	110	110	135	215	220	240	275	350	460	490	620	660
OIL (Ltrs)	55	90	100	120	180	180	195	210	270	325	350	440	460

Dimmerstat

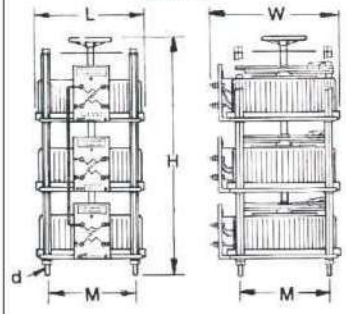
Power System Division

0.75 to 1600 Amps

8D - 3F



28D - 3F

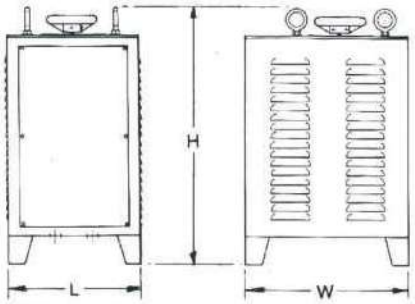


2D - 3F

28D - 3F

3 PHASE FLUSH MANUAL (AIR COOLED) 3 F										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	109	175	175	175	192	220	250	250	305	310
W (mm)	120	190	190	190	210	140	190	295	350	325
H (mm)	390	485	485	485	485	530	585	585	600	585
M (mm)	92	146	146	146	154	176	204	204	238	250
d (mm)	6	10	10	10	10	10	12	12	12	10
Wt (Kg)	9.6	18.4	24.2	24.5	29	42.6	55	57.2	71.2	64.3

28D - 3P

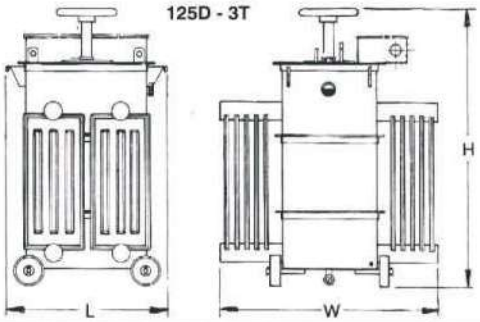


8D - 3P

28D - 3P

3 PHASE PORTABLE MANUAL (AIR COOLED) 3 P										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	150	190	190	190	210	240	305	305	360	360
W (mm)	160	240	240	240	265	305	375	375	435	460
H (mm)	390	500	500	500	525	560	660	660	680	680
Wt (Kg)	13	24	30.3	30.6	36	51.2	67.4	69.5	82.2	96

125D - 3T



100D - 3T

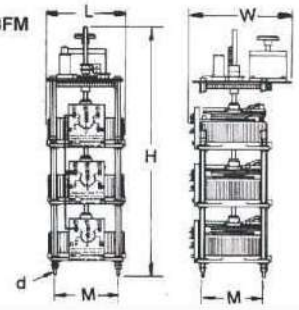
3 PHASE MANUAL (OIL COOLED) - 3 T									6T		
Current Rating	40	50	60	75	100	125	150	200	250	300	400
L (mm)	720	750	850	835	835	835	1055	1355	2155	2050	2350
W (mm)	610	670	770	840	1040	1140	970	1270	1560	1605	1905
H (mm)	1090	1090	1090	1360	1360	1360	1435	1435	1510	1720	1720
Wt. (Kg)	150	170	185	315	355	370	490	590	1000	1200	1400
OIL (Ltrs)	115	125	130	245	270	275	330	385	630	910	985

Dimmerstat®

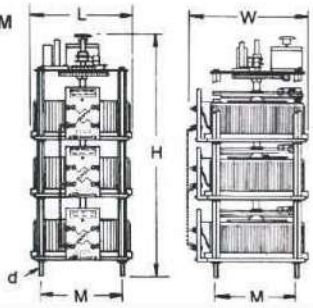
Power System Division

0.75 to 1600 Amps

4D - 3FM



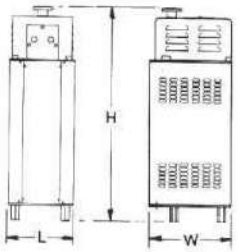
28D - 3FM



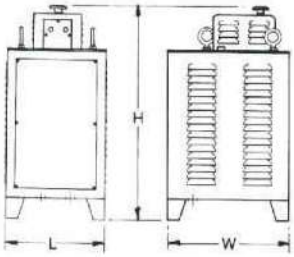
15D - 3FM

3 PHASE FLUSH MOTORISED (AIR COOLED) 3 FM										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	155	175	175	175	192	220	250	250	305	310
W (mm)	210	230	230	230	230	250	295	295	350	325
H (mm)	490	580	580	580	580	625	680	680	700	645
M (mm)	92	146	146	146	154	176	204	204	238	250
d (mm)	6.0	10	10	10	10	10	12	12	12	10
Wt (Kg)	11.8	21.2	26.3	27	31.8	45.4	57.8	60.5	74	68.5

2D - 3PM



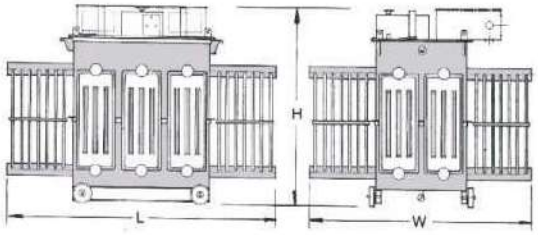
28D - 3PM



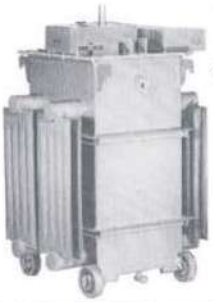
20D - 3PM

3 PHASE PORTABLE MOTORISED (AIR COOLED) 3 PM										
Current Rating	2	4	6	8	10	15	20	24	28	35
L (mm)	190	190	190	190	210	240	305	305	360	360
W (mm)	240	240	240	240	265	305	375	375	435	460
H (mm)	515	620	620	620	620	715	750	750	765	765
Wt (Kg)	17.6	27.6	34	34.2	40.2	55	72.4	74.5	86.6	101

400D - 6TM



75D - 3TM



3 PHASE MOTORISED (OIL COOLED) 3 TM									6 TM			9TM		12TM	30TM		45TM
Current Rating	40	50	60	75	100	125	150	200	250	300	400	500	600	800	1000	1200	1600
L (mm)	720	750	850	835	835	835	1055	1355	2155	2050	2350	2710	2910	2700	2670	2970	2970
W (mm)	610	670	770	840	1040	1140	970	1270	1560	1605	1905	1910	2110	2160	2470	2770	3270
H (mm)	1080	1080	1080	1350	1350	1350	1425	1425	1450	1720	1720	1720	1720	2110	2340	2340	2340
Wt. (Kg)	160	180	195	325	365	380	500	600	1000	1200	1400	2000	2100	2800	3040	3250	4730
OIL (Ltrs)	115	125	130	245	270	275	330	385	630	910	985	1410	1475	1820	3110	3280	4360

AC Voltage Stabilizers

Power System Division

1 KVA to 3500 KVA

DESCRIPTION

'AE' make Servo Controlled Automatic AC Voltage Stabilizers conform to 1S:9815 & are of Electro -Mechanical Type Stabilizer (EMS)

The purpose, of voltage stabilizer is to receive a fluctuating AC voltage of large amplitude & deliver an almost constant voltage, which remains within a very narrow band (± 1%) of the nominal voltage - quality of the AC voltage remains unchanged.

The voltage variations, which have become a common phenomenon in power supply system, caused havoc in modern complicated & sophisticated equipments. The voltage stabilizers are meant to take care of this problem & protect the equipments. They ensure longer life of the equipments & also drastically cut down electricity consumption of equipments leading to continuous reduction in electricity bills. Thus, they play an important rote in energy conservation which is need of the day.

The EMS type AC voltage stabilizers basically comprises of the following –

- Motorised Dimmerstat (Continuously variable voltage auto transformer).
- Buck-Boost Transformer
- AC Step-synchronous motor.
- Solid state electronic control circuit with switching triacs
- MOVs for surge suppression.

FEATURES

- Waveform distortion - nil.
- High efficiency (98-99%) (achieved by optimum design & by use of imported hi-quality CRGO laminations & 99.9% purity copper)
- Highspeed of correction (depends on input voltage range and capacity)
- Response time - less than 20ms.
- Immune to load PF & supply frequency variations.
- Power loss max. 2%
- Continuous Duty cycle
- Life expectancy - 20 -25 years.
- Easy & simple maintenance (with plug-in PCBs).
- Protections - over voltage / under voltage / overload - (optional)
- Very high reliability.
- Considerable short time overload capacity. (Suitable for starting current of Induction Motor)
- Output voltage setting (by potentiometer in Auto Mode & by Raise / Lower Push Button in Manual Mode)
- Operation - Auto or Manual.
- LED Indications for Input Voltage High / Low.
- Metering (Analogue or Digital) – AC voltmeter with / without selector switch.
- Non-standard requirements can be catered to , such as AC Ammeter, Frequency Meters, Phase Sequence Meters, Single Phasing Preventor, Stabilizer by – pass arrangement, etc.

AC Voltage Stabilizers

Power System Division

1 KVA to 3500 KVA

THE CONTROL & MONITOR SYSTEM OF THESE VOLTAGE STABILIZERS HAVE FOLLOWING STANDARD FEATURES

1. Alarm lamps which light up when the input voltage goes above or below the maximum or minimum specified Input Voltage
2. Voltmeter, with selector switch, to indicate either input or output voltage.
3. Screw driver adjustment to set the output voltage to the exact specified level.
4. 'Auto-Manual' selector switch to select the mode of working of the Stabilizer. In the event of failure of Automatic control, the unit can be used under Manual control.
5. Push Button Switches marked "Raise" & "Lower" to increase or decrease the output voltage when unit is under manual control.
6. Easily replaceable and serviceable printed circuit cards.(PCB)

Following deviations from standard types of Stabilizers are possible, subject to confirmation:

1. Non-standard input voltage range, output voltage and KVA rating.
2. Automatic Alarm/Power cut-off in case of over voltage, under voltage, overload and phase failure.

ELECTRICAL SPECIFICATIONS

MODEL	:	EMS-12
TYPE	:	Indoor, Floor Mounting.
COOLING	:	Air–Cooled / Oil Cooled / Air – Oil Cooled.
INPUT	:	160 - 260V / 180 - 250V, 1Phase AC. 300 - 460V / 360 - 460V, 3Phase, AC 4 Wire (or 3 Wire if required) (for a Balanced or Unbalanced input voltages)
OUTPUT	:	220V / 230V / 240V ±1%, 1 Phase AC. 380V / 400V / 415V ±1%, 3 Phase AC.
CAPACITY	:	1kVA - 3500kVA
FREQUNCY	:	50 - 60Hz.
INSULATION RESISTANCE	:	Above 5M ohms at 500V DC
DIELECTRIC TEST	:	1.5kV RMS for 1 minute.
OPERATING TEMP.	:	0°C to 50°C
STORAGE TEMP.	:	-9°C to 70°C
HUMIDITY	:	up to 95% RH
CONFORMS TO	:	I.S. 9815

NOTES

- Input & output voltages, other than specified above, are available on specific request.
- For 3 Phase balanced supply system, a common controller, connected to any one phase is employed.
- For 3 Phase unbalanced supply system, 3 individual & independent controllers, one for each of the 3Phases, are employed.
- Oil should be Transformer Oil Conforming to IS 335, IEC 296.

APPLICATIONS :

CNC Machines, Air Compressors, Textile Machines, Lightings, X-ray & Medical Equipments, Engineering Units, Computers, Pump Sets, Transmitters & many other similar applications.

Ordering information

- Model
- Type
- Cooling
- Input Voltage range (Balanced or Unbalanced)
- Output Voltage
- Capacity (kVA)
- Protections (if required)
- Non-standard metering.
- With / without first filling of oil (only for oil cooled units).

Rectifier Units

Power System Division

Upto 24V DC 10000Amps for Electroplating and Anodising

These Rectifier units are suitable for all electro deposition processes within their rating. The widest applications in the field require maximum voltage of 8V, 12V and 20V D.C. at various current capacities as per requirement. A range of current ratings from 100 amps to 10000 amps is covered in our regular manufacture. Our standard sizes are listed in the price list issued separately.

BRIEF SPECIFICATION

Input Voltage	:	360 to 440V A.C. 3 Phase 50 Hz 4 Wire
Output Voltage	:	Continuously variable from zero to the full rated D.C. voltage
Output Current	:	From zero to Rated maximum D.C. Current
Efficiency	:	Above 80%
Temperature Rise	:	Less than 45°C above ambient at the top of the oil

A. C. Input :
'AE' make Electroplating Rectifier units are designed for three phase, 50Hz. AC input supply and are suitable for operation at any voltage between 360 to 440 volts. Thus, it covers a wider range to cater for mains voltage fluctuations. The input to the unit is to be connected through a switchfuse unit of proper rating, which is not included in the scope of the supply and has to be procured separately.

D.C. Output :
The D. C. output is continuously and steplessly variable from zero to the full rated voltage for any input voltage between 360 to 440 volts and for any load between zero to its rated full load. The ripple content in the output is very low (approximately 5%) and as such these units are very much suitable for all special processes such as chrome plating or hard chrome plating where low ripple content is necessary.

Circuit and Components :
The circuit employed in this rectifier units is simple and universal. Supply is given to Dimmerstat (continuously variable voltage auto transformer), which in turn supplies a variable voltage to the primary of a three phase doube wound Delta / Double star connected transformer through H. R. C. fuses. The secondary of the transformer is connected to Hexa-phase connected rectifier using Silicon Diodes. The output is obtained from the rectifier and the star points of the transformer through an interphase transformer. Moving Coil voltmeter and ammeter with shunt are provided to measure the output voltage and output current.

a) Dimmerstat :
Output is an important factor in Electrodeposition processes. 'AE' provide a stepless and continuous variation of output voltage, which is a far superior method to other methods of control like resistance boards, tap switches etc. The stepless variation is achieved with the help of 'Dimmerstat' which is Registered Trade name for Continuously Variable Voltage Auto Transformer manufactured by 'AE'. Unlike other methods of output control, Dimmerstat provides a stepless, on-load and without break variation of output Voltage, without any loss of power. It being one of our own standard product, availability of spares or replacement is guaranteed, although the necessity is very rare.

b) H.R.C. Fuses :
Overloading or short circuiting is not a rare occasion in Electro deposition processes. Special High Rupturing Capacity (H.R.C.) fuses are therefore provided on the primary of the Main transformer. These fuses will blow only when there is overload or short circuit on the output or if there is an internal short circuit and in such cases they should be replaced by H.R.C. fuses of the same rating only.

c) Double Wound Transformer:
This is of conventional design and conforms to standard specifications of IS 2026 as regards the temperature rise and insulation are concerned. The primary is delta connected and two secondaries has star connected windings.

d) Interphase Transformer :
The IPT is Connected between two star points of the secondaries of the main transformer, The Interphase transformer improves commutation thereby increasing the rating of the Rectifier.

e) Rectifier :
This is made up of sturdy liberally rated Silicon diodes and are arranged in a six phase circuit. The diodes are mounted on cooling fins so as to dissipate the heat thereby increasing the rating of the diode. Depending upon the output current rating, necessary number of diodes are connected in parallel.

f) Metering :
A Voltmeter and an Ammeter are provided on a separate panel to indicate the output voltage and output current. The panel is mounted on one of the tanks to enable easy manipulation with the help of the Dimmerstat.The ammeter is used in conjunction with an external shunt,which is fitted inside the tank. The voltmeter, ammeter and the shunt are all manufactured by ourselves and are therefore obviously backed by 'AE's well-known after sales service.

Rectifier Units

Power System Division

Upto 24V DC 10000Amps for Electroplating and Anodising

CONSTRUCTION:

The units are made in natural oil immersed construction. Any Electro deposition process is always associated with acidic and corrosive fumes and dust. Any contact with these fumes and dust obviously reduces the life and reliability of the Rectifier. Oil immersed construction offers best protection to the Rectifier unit in this regard and therefore increases the life enormously. The Dimmerstat is always housed in separate tank. For rectifier units upto a maximum output capacity of 100KW, the transformer and the rectifier are housed in one single tank. For higher capacities separate tanks for transformer and rectifier are used. For rectifier units of current rating 5000 amperes and above, the rectifier is supplied in Separate tank for better cooling.

If the customer can guarantee that sufficient precaution is taken to see that corrosive fumes and dust do not come in contact with the rectifier unit, we will be pleased to make special offers for units in Air cooled or combined OIL/AIR cooled construction.

Connection :

The mains supply is to be connected to the Dimmerstat input terminals by a cable of proper size through a switch fuse unit. The cable of same size should be used for connections from Dimmerstat output to the primary of the transformer. If the transformer and rectifier are supplied in more than one tank, the busbars of proper sizes for interconnection between various tanks are supplied free with the rectifier unit. The output busbars are brought out, to which the output connections should be made by busbars of proper size.

Note :

The Units can also be supplied for remote control or automatic control of output. For remote control, a separate control panel can be provided to operate the motor of the Dimmerstat by means of push buttons & a Voltmeter & Ammeter to indicate the output voltage and current. In case of automatic control the customers are requested to specify the mode of control, whether the requirement is for automatic constant voltage or constant current. These will be at an extra cost which will be quoted against specific requirements. Units of ratings beyond our standard specifications, such as input voltage range, maximum output voltage and current or with overload requirements of short duration can also be quoted against specific enquiries.

A.C. Synchronous Motor

MODEL : SS-32, SS-72, SS-102, SS-202, SS-302

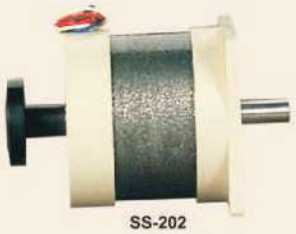
DESCRIPTION

These are basically two phase Permanent Magnet motors. two-phase supply is normally not available. hence to operate the motors from singe phase AC supply, second phase is artificially created by inserting a Capacitor and Resistor combination in series with one of the motor windings. Suitable combination of Capacitor and Resistor assembly is supplied along with the motor. The speed of revolution is 60 RPM at 50Hz. Instant start, stop reversibility are achieved by means of a SPDT Centre off switch.

FEATURES

- Instant start & stop.
- The motors have permanent magnet on the toothed rotor. The rotor is locked with matching teeth on stator, as soon as power is switched OFF.
- Starting & running currents are same.
- Maximum Torque is 15 to 20% higher than nominal torque.

SS-302



SS-202

SS-102

SS-72,SS-32

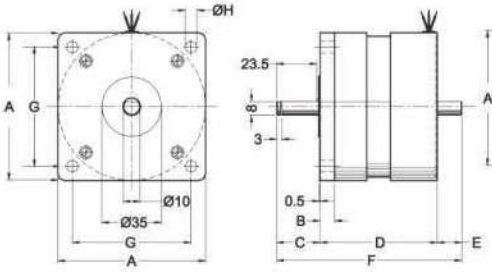
ELECTRICAL SPECIFICATIONS

MODEL→	SS-32	SS-72	SS-102	SS-202	SS-302
VOLTAGE	240V. A.C.	240V. A.C.	240V. A.C.	240V. A.C.	240V. A.C.
CURRENT	100mA	100mA	200mA	300mA	500mA
RESISTOR	1kΩ / 15W	1kΩ / 15W	1.8kΩ / 20W	800Ω / 100W	235Ω / 200W
CAPACITOR	0.7mfd / 400V. A.C.	0.7mfd / 400V. A.C.	1.0mfd / 400V. A.C.	3.0mfd / 400V. A.C.	4.0mfd / 400V. A.C.
NOM.TORQUE	3kg cm	7kg cm	10kg cm	20kg cm	30kg cm

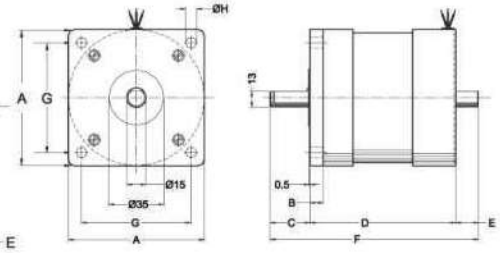
MECHANICAL SPECIFICATIONS

MODEL	DIMENSIONS in mm								WT.kg
	A	B	C	D	E	F	G	ØH	
SS-32	87	5	27	70	20	120	70	7	1.3
SS-72	87	5	27	70	20	120	70	7	1.3
SS-102	108	5	27	70	20	120	85	8	2.0
SS-202	108	7	34	104	22	160	85	8	3.4
SS-302	108	7	34	132	24	190	85	8	4.5

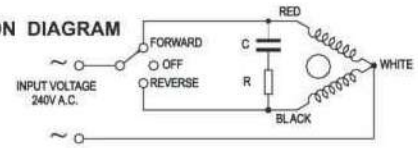
SS-32 / SS-72 / SS-102



SS-202 / SS-302



CONNECTION DIAGRAM



Ultra Isolation Transformers

Power System Division

1 KVA to 300 KVA

Single Phase / Three Phase, Indoor, air cooled, enclosed.

SAILENT FEATURES

1. Isolation Transformer:

Any Double Wound Transformer is internally an isolation transformer as the primary and secondary are isolated from one another through insulation. However, modern machines and systems need a truly isolated, clean and stable power requirement. This is ensured by an Ultra Isolation Transformer (UIT), it provides for total electrical and electrostatic isolation with most effective screening of spikes, surges and transients, further it gives a true isolated local neutral and dedicated earth which are very essential for modern machines.

Ultra isolation Transformer attenuate common mode noise and transverse mode noise and provides for noise or interference free power. In principle, UIT only transfers 50 Hz. Power by transformers action through mutual inductance. It prevents transfer of RF and HF disturbances with extensive insulation between primary and secondary. The insulation levels withstands HV breakdown strength of 2.5 KV and gives a DC Galvanic isolation of above 1000 megohms.

2. Ingress Protection for enclosure for isolation Transformer

AE Isolation Transformer conform to IP-20 protection as per IS / IEC : 60529 : 2001
Requirements for other degree of protection can be offered on request.

3. Details of Earthing for Isolation Transformers:

It is recommended that every isolation Transformer should have its own grounded earth, complete in itself.

4. Constructional Features of Isolation Transformers:

Isolation Transformer shall invariably be in one air cooled section.
The enclosures are constructed from M.S. angles and CRCA M.S. sheets of best quality

The professional painting process comprises of (i) 7-tank pre-treatment (ii) Primer Coating and (iii) Two coats of final finish paint or powder coating of specified shade

TECHNICAL SPECIFICATIONS

Ratio	:	415 V / 415 V 3ph or 240 / 240V 1ph. Nominal
Acceptable Input Range	:	±10%
Mode of operation	:	1:1 Isolation Transformer
Frequency	:	47 to 63 Hz.
Common mode noise rejection	:	Over 100 dB
Coupling Capacitances	:	0.012 PF
DC Galvanic Isolation	:	Over 500 Megohms between any winding or windings to ground
Breakdown strength	:	2500 V AC for 2 minutes
Load Regulation	:	Within 3 to 5 %
Termination	:	On Terminal Plate

Ordering Information

Input voltage, output voltage, capacity, Number of phases, CMNR value, coupling capacitances value

Current Injection Test Unit

Power System
Division

10,000 Amps

APPLICATION

Protective devices such as over current relay, short circuit relay, circuit breakers and CTs etc must be checked and calibrated regularly to ensure that they are always ready to operate correctly. Current injection testing sets will help detecting faulty or incorrectly adjusted protection circuit / device and thereby avoid damage to the system. With the help of current injection test sets the correct functioning of protective device / circuit is ensured.

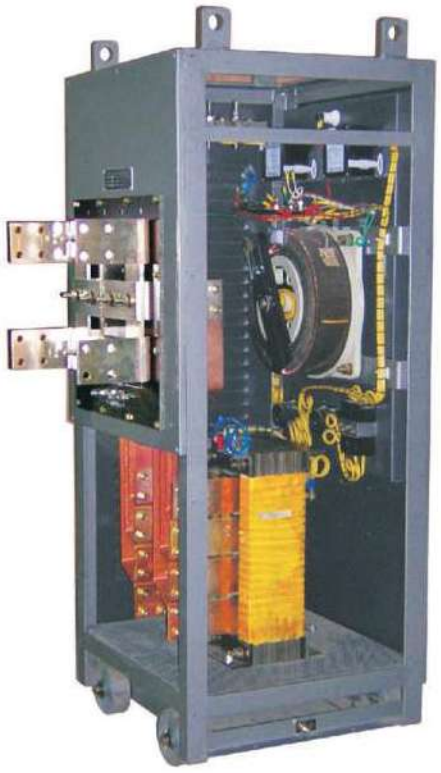
The primary current injection testing checks all parts of protection system by injecting current drawn by system the cable/busbars. It ascertains the current carrying capacity of any conductor, connector or calibration of CTs / bimetallic relays. The units are available in single phase version for small capacity and single or two phase version for higher capacities.

FEATURES

- Primary Current Injection test set basically provided high currents (From 100 to 15000Amps) at lower voltages (From 2V to 10V)
- Continuously variable outputs (0 to rated current)
- Dimmerstat (Continuously Variable Voltage Auto Transformer)
- Double wound loading transformer
- Built - in Analogue Ammeter with C.T.
- Time Interval Meter from .0001 sec to 9999 sec (auto ranging facility) - Optional

Ordering Information

Supply Voltage :
Output Voltage :
Output Current :
Type of Cooling :
Duty Cycle :
Any other information, subject to confirmation from AE. :



Low Tension Power Transformers

Power System Division

0.5 KVA to 800 KVA

- **Mining Transformer**
- **Lighting Transformer**
- **Loading Transformer**
- **Furnace Transformer**
- **Motor starting Auto Transformer**
- **Rectifier Transformer**
- **Ultra Isolation Transformer**

No of Phase

- Single Phase
- Three Phase
- Three Phase to single Phase
- Three Phase to Two Phase (Scott)

Type of Transformer

- Double wound Transformer
- Auto wound Transformer

Type of cooling

- Natural Air cooled
- Natural Oil cooled

Salient Features

- Ranging from 12V to 660V at 50 Hz / 60 Hz
- Capacity = 0.5 to 800 KVA
- Taps can be provided with OFF load Tap changer using links or Switch
- Conforms to IS : 2026 / IS : 11171
- Class of insulation class B / F / H
- Efficiency better than 96%
- Regulation better than 5%

Natural Air cooled transformers are supplied in sheet steel ventilated case, with screwed top cover. Input and output terminals are provided on the top side of the transformer, inside the Terminal Box. Cable entry holes are provided on the bottom side of the Terminal Box. The transformers are suitable for floor mounting and are also supplied with M.S. Rollers for easy portability in case of large size transformers.

Natural oil cooled transformers are supplied in M.S. tanks. In some cases, the tanks are provided with cooling radiators on two or all the four sides. As a standard practice, the tank is provided with oil fitting hole with cap, oil level indicator, drain plug, and earthing terminals. Input and output terminals are brought out generally on two opposite sides, either from the sides of the tanks or from the top of the tank.
Plain unidirectional M.S. rollers are fitted on M.S. channels for base mounting.

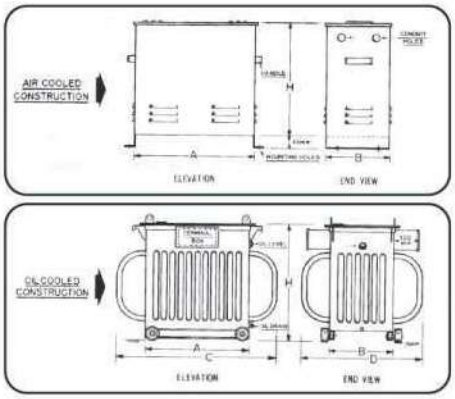
'AE' also supply transformers in open execution, without any enclosure, when they are to be mounted inside a control panel or a cubicle.

The description given below are for single phase, three phase and three phase to single phase double wound transformers. It is valid only for double wound transformers and for phase voltage between 24 volts and 660 volts at a frequency of 50 Hz. For voltages beyond this range and for other frequencies will be made on request.

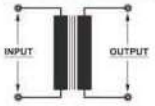
In case of Auto Wound Transformers though the entire range falls within our regular manufacture, their details depend very much on the transformation ratio, in addition to the capacity. Therefore special quotations should be obtained in individual cases. These include single phase and three phase Star-connected transformers, auto-boosters and off-load line voltage correcting transformers.

SINGLE PHASE DOUBLE WOUND TRANSFORMERS

As stated before, these are made in natural air cooled construction or natural oil cooled construction. Extra off-load taps can be provided on request. The capacity of the transformer at the tap will be proportionately low corresponding to the tap voltage. The declared capacity will hold good only for the highest voltage on both input and output, unless the taps are specified as full capacity taps.



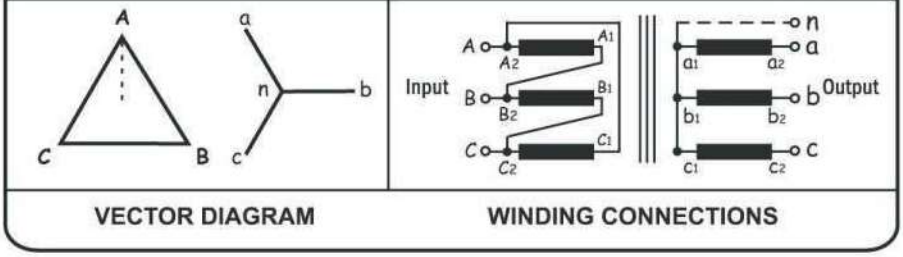
WINDING CONNECTIONS



THREE PHASE DOUBLE WOUND TRANSFORMERS

These transformers are generally manufactured in Delta/Star or Star/Delta connections. However, transformers can also be supplied suitable for Delta/Delta or Star/Star or Open delta/Open delta connections on request against specific requirements. Enquiries or orders should clearly state the voltage and connection on the primary and secondary and whether the voltage are between phases or between phase and neutral. Extra off-load taps can be provided at extra cost. The capacity of the transformer at the tap will be proportionately reduced corresponding to the tap voltage, The declared capacity will hold good only for the highest voltage on both input and output unless the taps are specified at full capacity taps.

A TYPICAL VECTOR GROUP WITH WINDING CONNECTIONS (Dy11)



VECTOR DIAGRAM WINDING CONNECTIONS

THREE PHASE TO SINGLE PHASE DOUBLE WOUND TRANSFORMERS

These transformers are very widely used where large single phase power is required. These are wound as open delta on the three phase input side and the windings on the secondary are connected in series for single phase output as per diagram shown below. This type of construction given an unbalance in the supply current. e.g. 10 KVA three phase to single phase transformer will have a current distribution as Phase A : 14.5 Amps, Phase B : 29 Amp and Phase C: 14.5 Amp approximately when the supply voltage is 400 volts nominal. However, this unbalance is less serve than when a single phase load is connected between phase and neutral or between phase to phase.