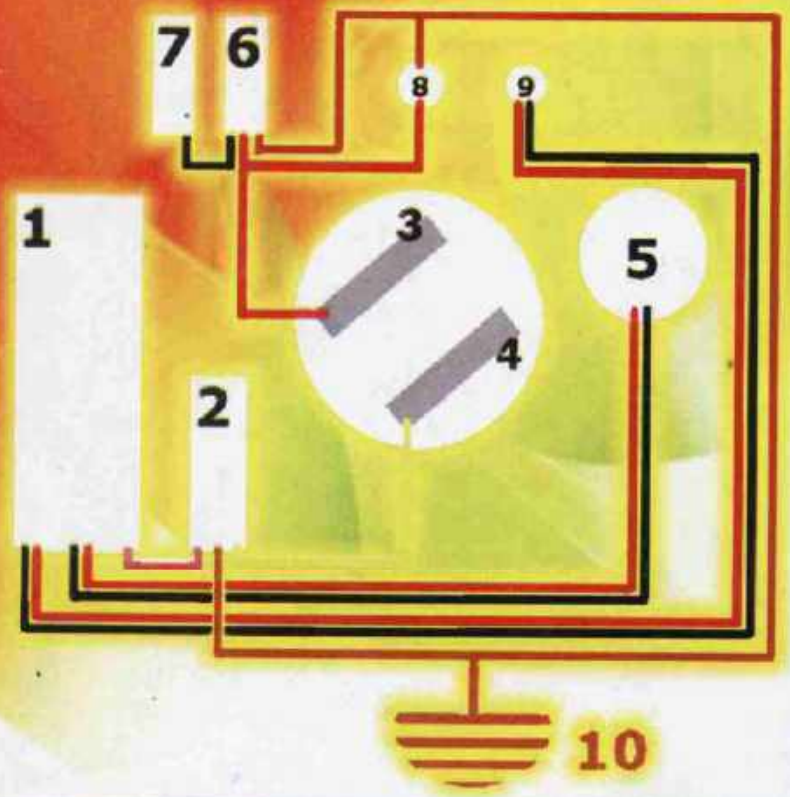
TECHNICAL DRAWING

Electrician General 2



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TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
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T.T.P. Series No.5

Price Rs. 30/-

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

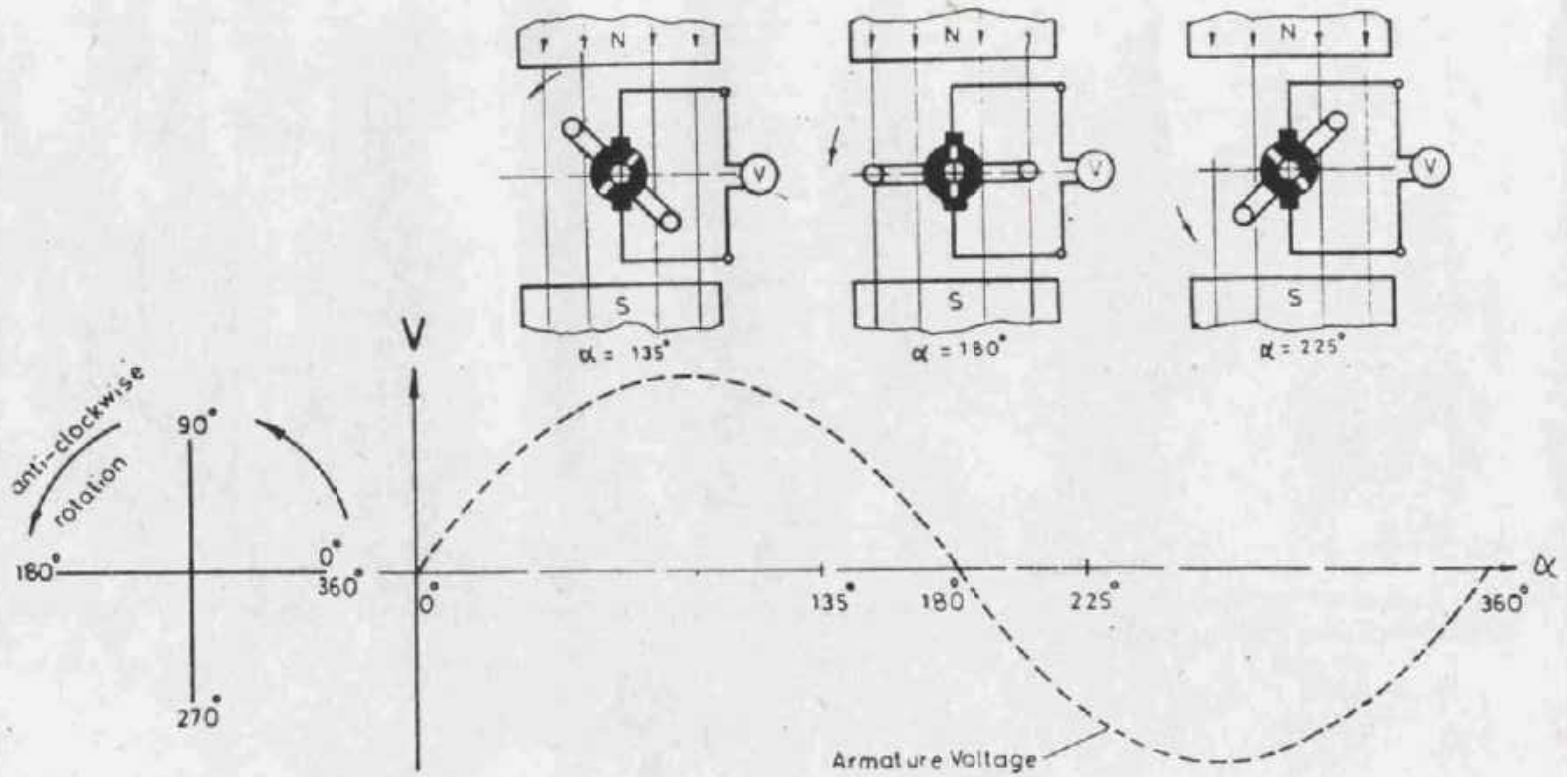
ELECTRICIAN GENERAL

DC GENERATOR
PRINCIPLE OF COMMUTATION

TECHNICAL DRG. No. 65

The sketch shows a basic generator. A single loop of wire is rotating between the poles of the field magnets in an anti-clockwise direction as indicated.

1) The conductor is shown in cross-section. Draw the direction of the induced voltage at the three moments into the sketch.
2) Specify the poles at the terminal.
3) Draw the voltage course at the brushes in the given diagram



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

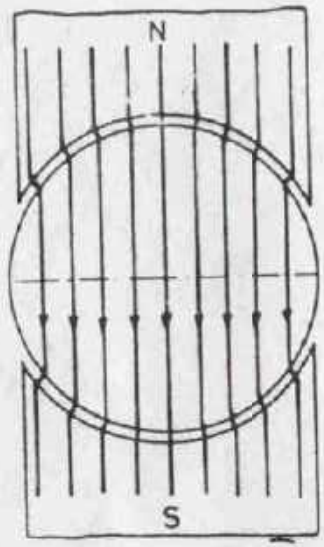
DC - GENERATOR -

ANGULAR DISPLACEMENT OF NEUTRAL AXLE

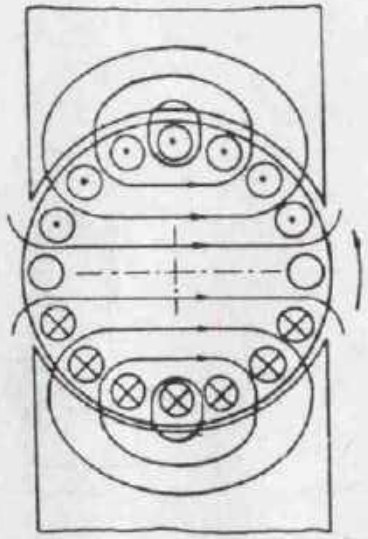
TECHNICAL DRG. No. 66

ELECTRICIAN GENERAL

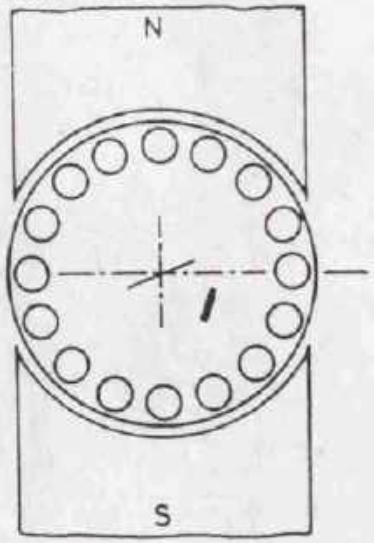
Direction of magnetic flux of the main field.



Direction of magnetic flux of the armature field.

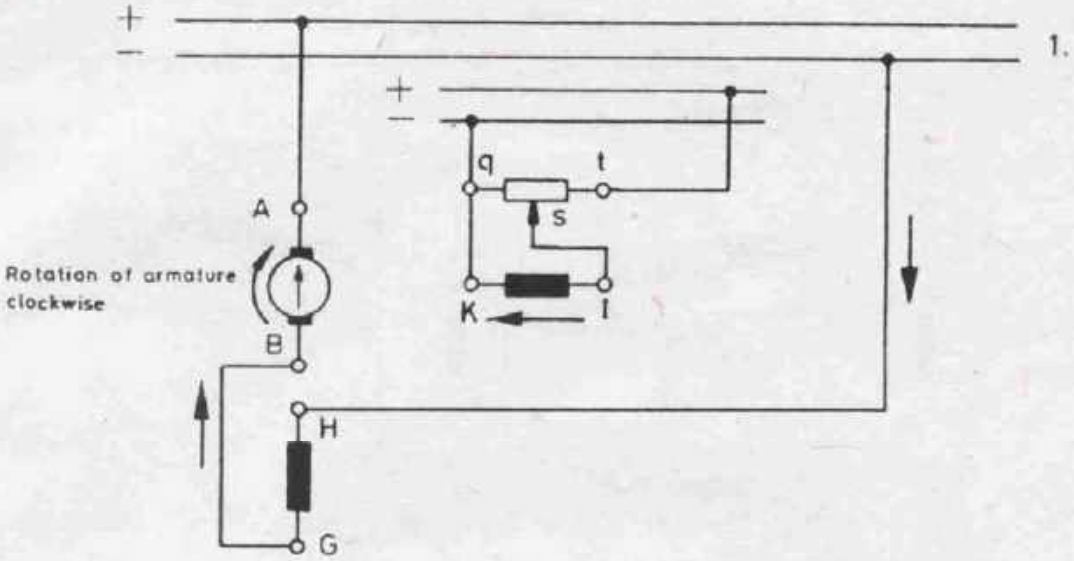


Direction of the resultant magnetic flux and angular displacement of the neutral axle.

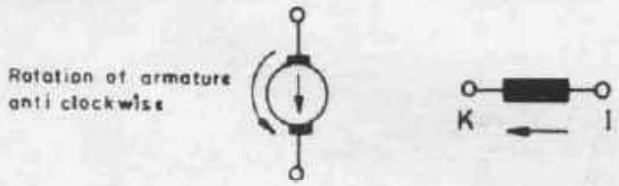


DRAW THE RESULTANT MAGNETIC FLUX ACCORDING TO THE MAIN FIELD, ARMATURE FIELD AND THE VECTOR DIAGRAM. FILL IN THE ANGULAR DISPLACED NEUTRAL LINE AND THE CURRENTS IN THE CONDUCTORS.

GENERATOR



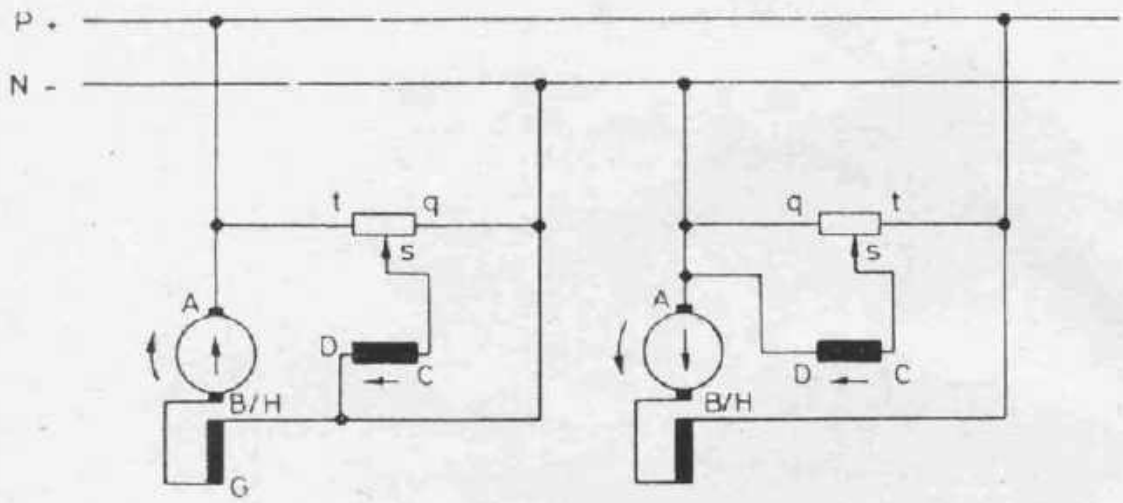
2.



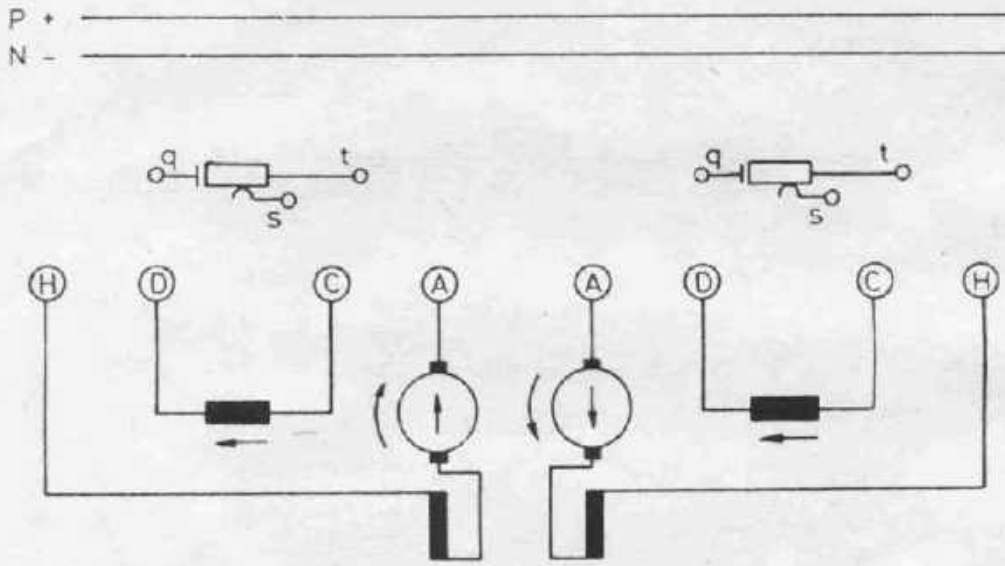
Complete circuit diagram No. 2 for the anticlockwise rotation and give all necessary designations of the circuit !

	DC – GENERATOR EXTERNAL EXCITATION	TECHNICAL DRG. No. 67
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

CURRENT PATH DIAGRAMS



CONNECTION DIAGRAMS AND TERMINAL PLATES

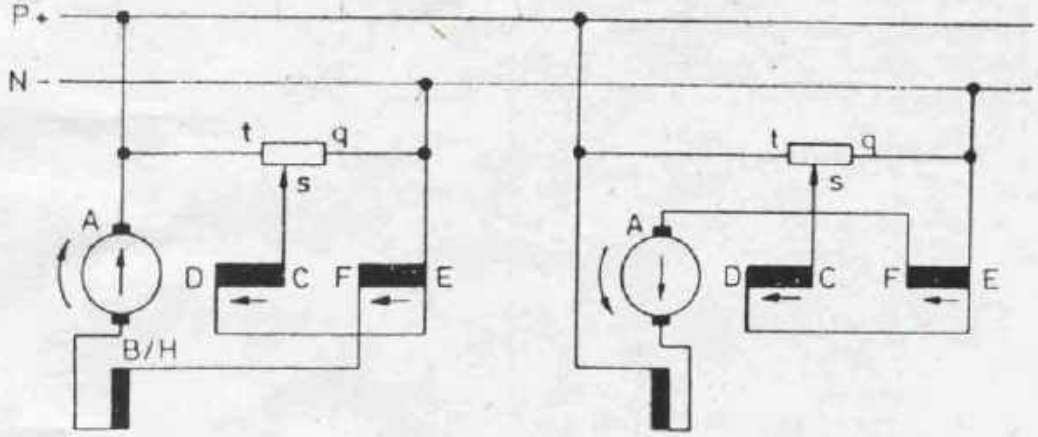


Complete the external connections of the two diagrams according to the above current path diagrams.

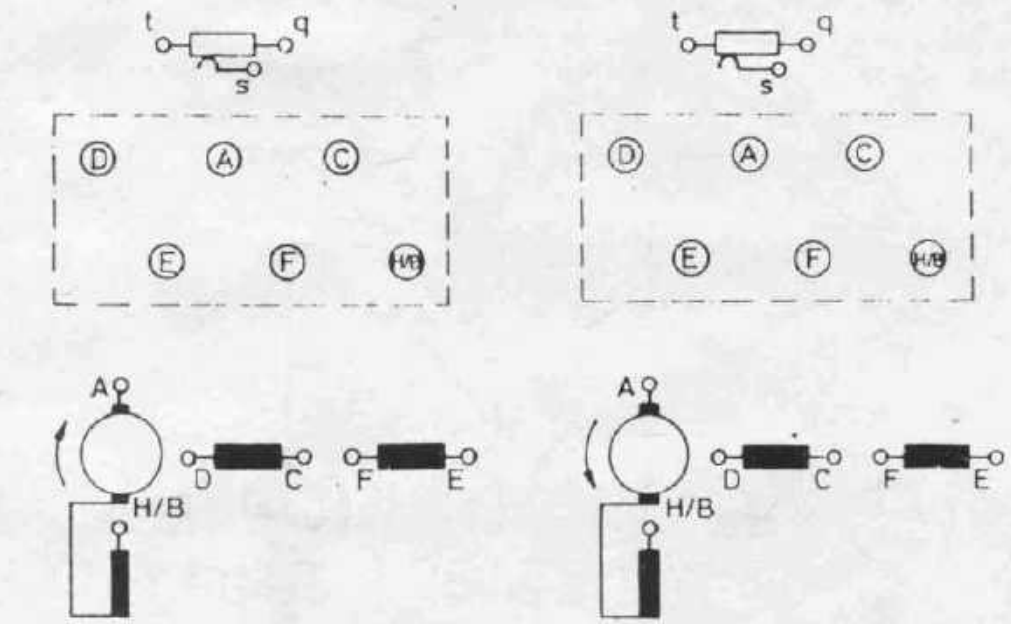
Connections : t with positive rotor terminal
9 & D with negative terminal plate
s with C

	DC - SHUNT - GENERATOR	TECHNICAL DRG No. 68
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

CURRENT PATH DIAGRAMS



CONNECTION DIAGRAMS AND TERMINAL PLATES



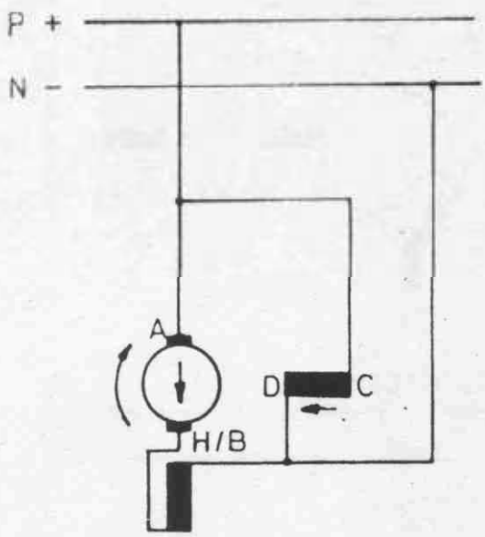
Complete the internal and external connections.

	DC - COMPOUND GENERATOR	TECHNICAL DRG. No. 69
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

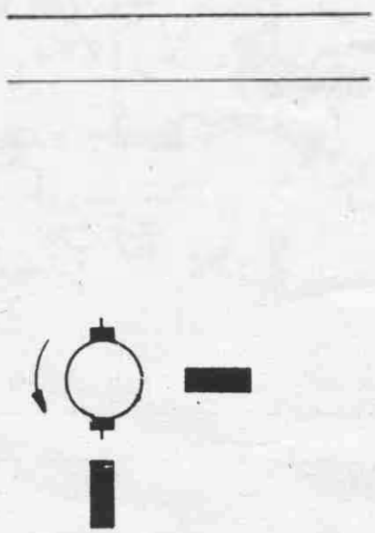
DIRECTION OF ROTATION

The direction of current is considered as from positive to negative. Then the armature rotates in that way that the vector of current in the armature turns into the direction of current of the excitation winding by the shortest way.

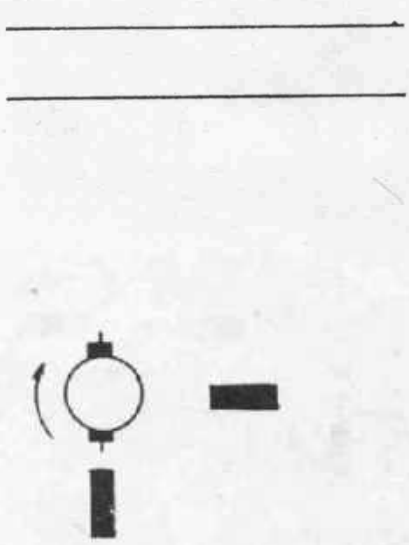
Shunt motor clockwise rotation!



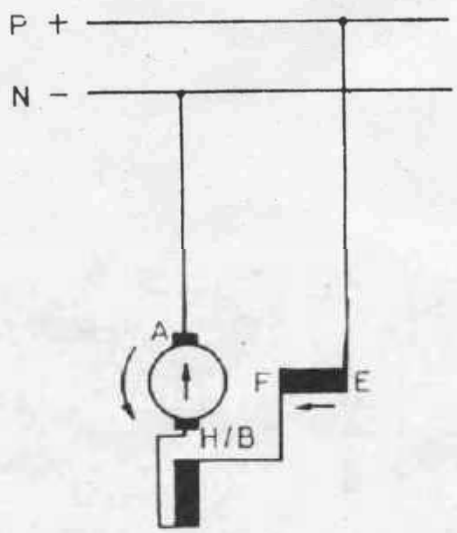
Shunt motor anticlockwise rotation



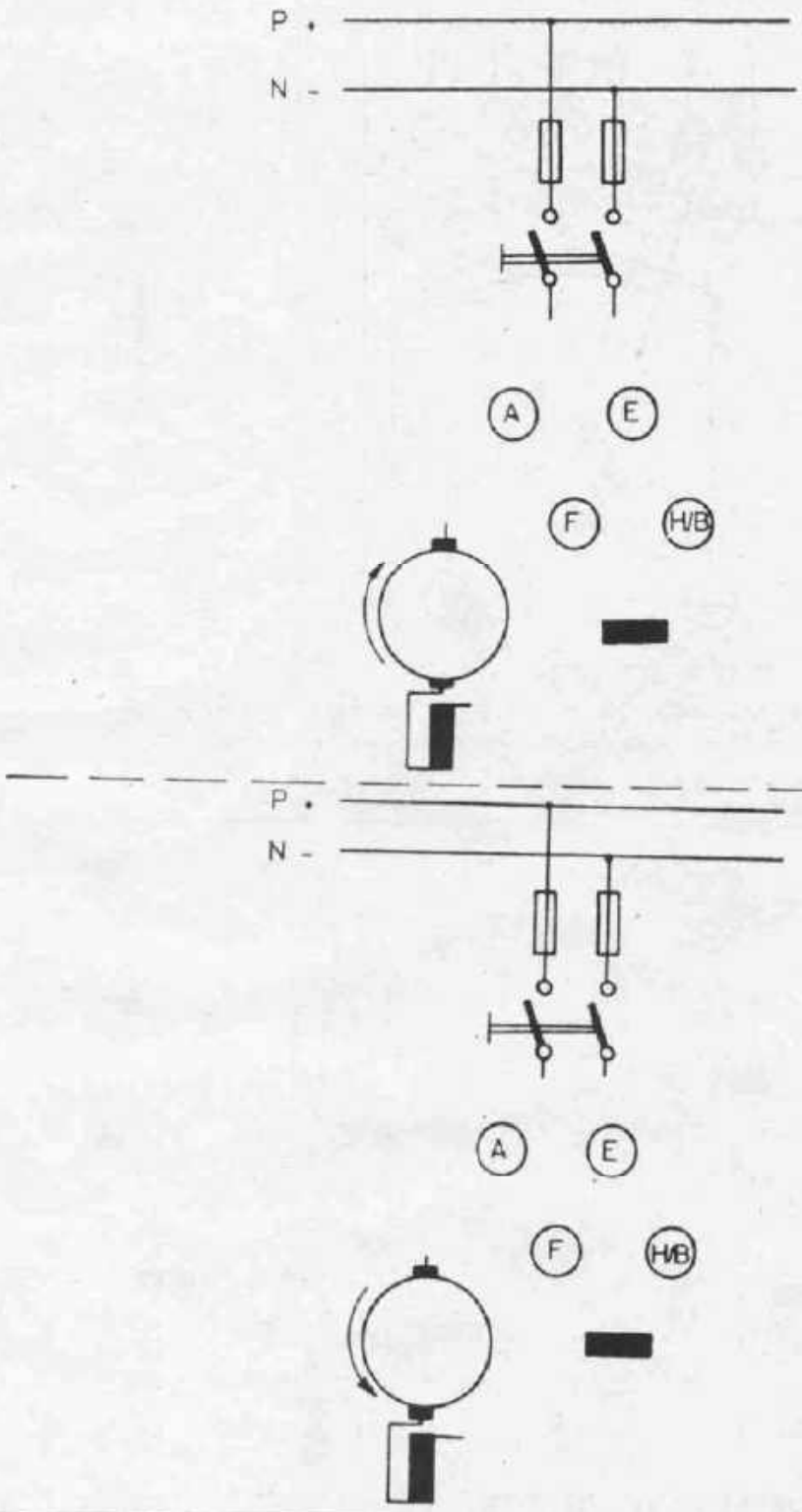
Series motor clockwise rotation



Series motor anticlockwise rotation



	DC - MOTORS DIRECTION OF ROTATION	TECHNICAL DRG. No. 70
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL



Complete the connect-ions for clockwise & anticlockwise rotation with the help of sheet No125

DC- SERIES MOTOR

TECHNICAL DRG. No. 71

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

ELECTRICIAN GENERAL

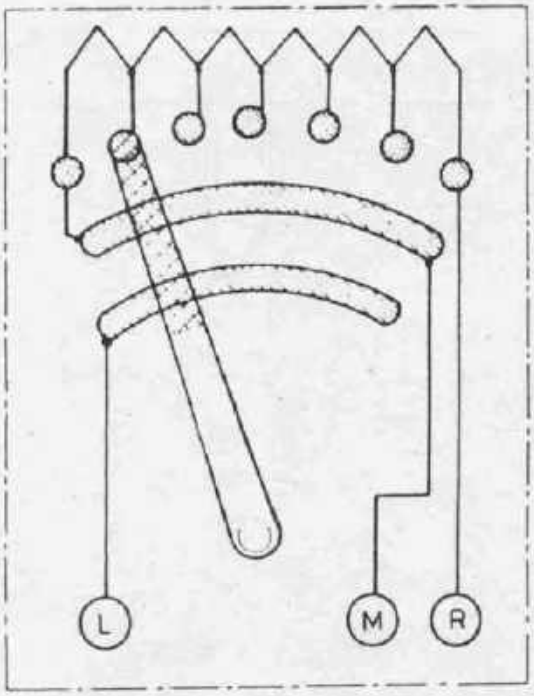
tapped starting resistor

Connection:

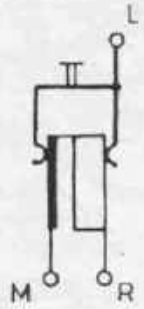
L → power supply

M → exitation winding

R → rotor winding



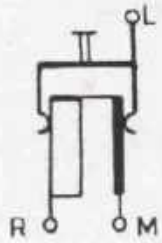
symbol of starter

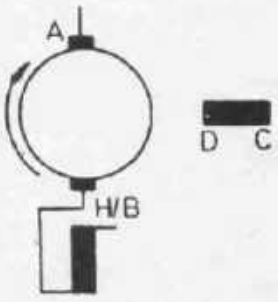


Note: For starting purpose of the shunt motor the rotor current is to be decreased while the exitation current has to remain constant.

P +

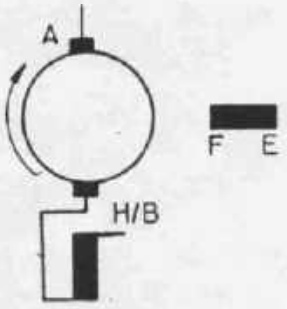
N −





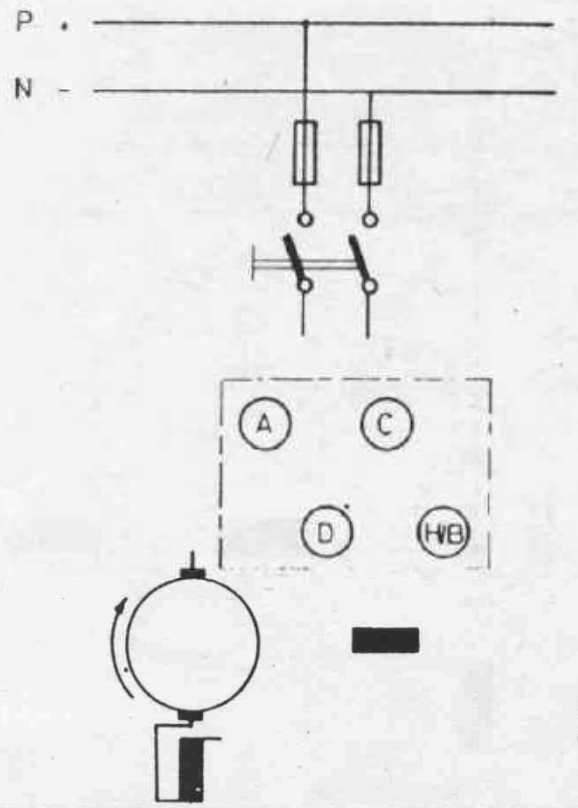
P +

N −

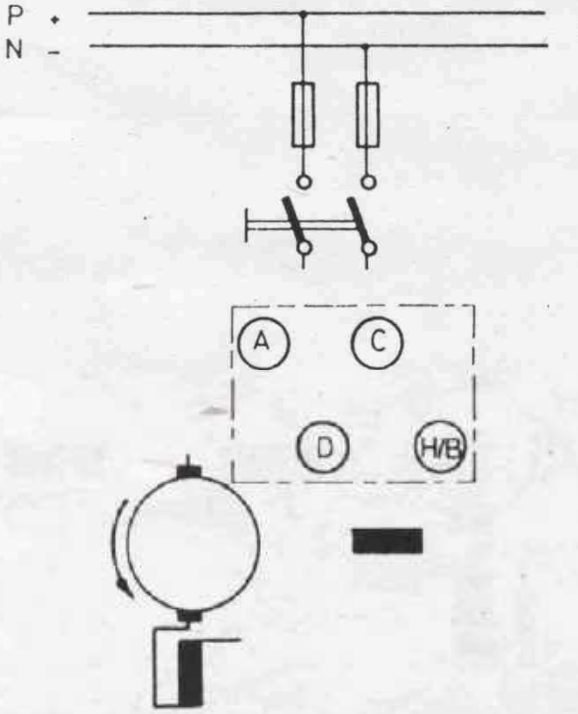


Complete the missing connections

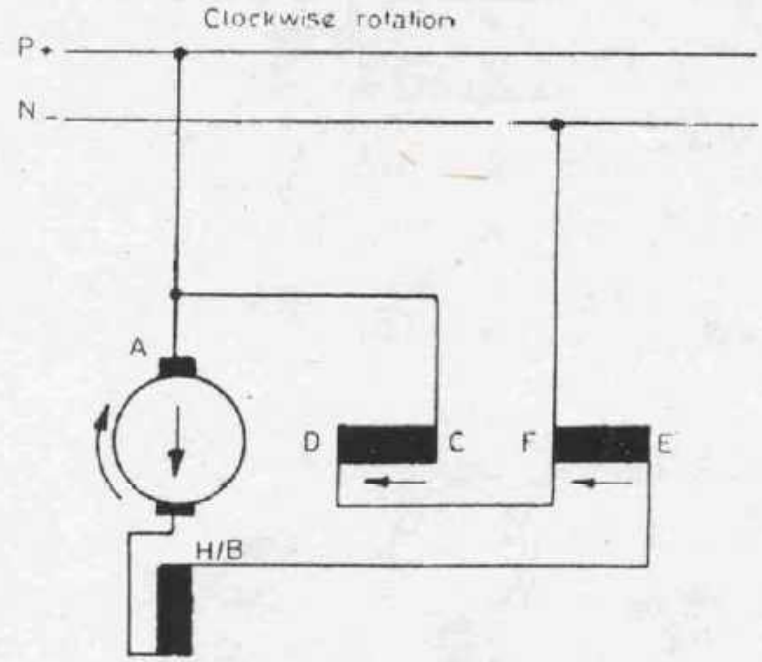
	DC MOTOR STARTER SHUNT & SERIES MOTOR	TECHNICAL DRG. No. 72
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

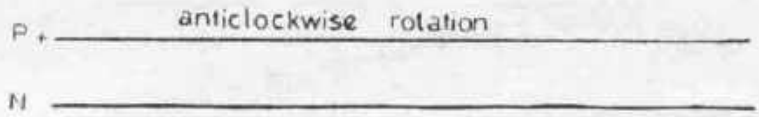


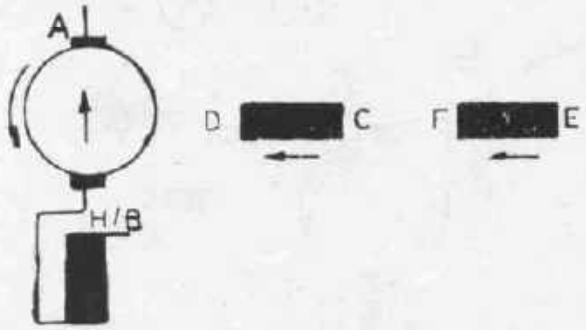
Complete the missing connections for clock-wise and anticlock-wise rotation with the help of exercise sheet No. 125.



	DC - SHUNT MOTOR	TECHNICAL DRG. No. 73
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL







Complete the connections for anticlockwise rotation

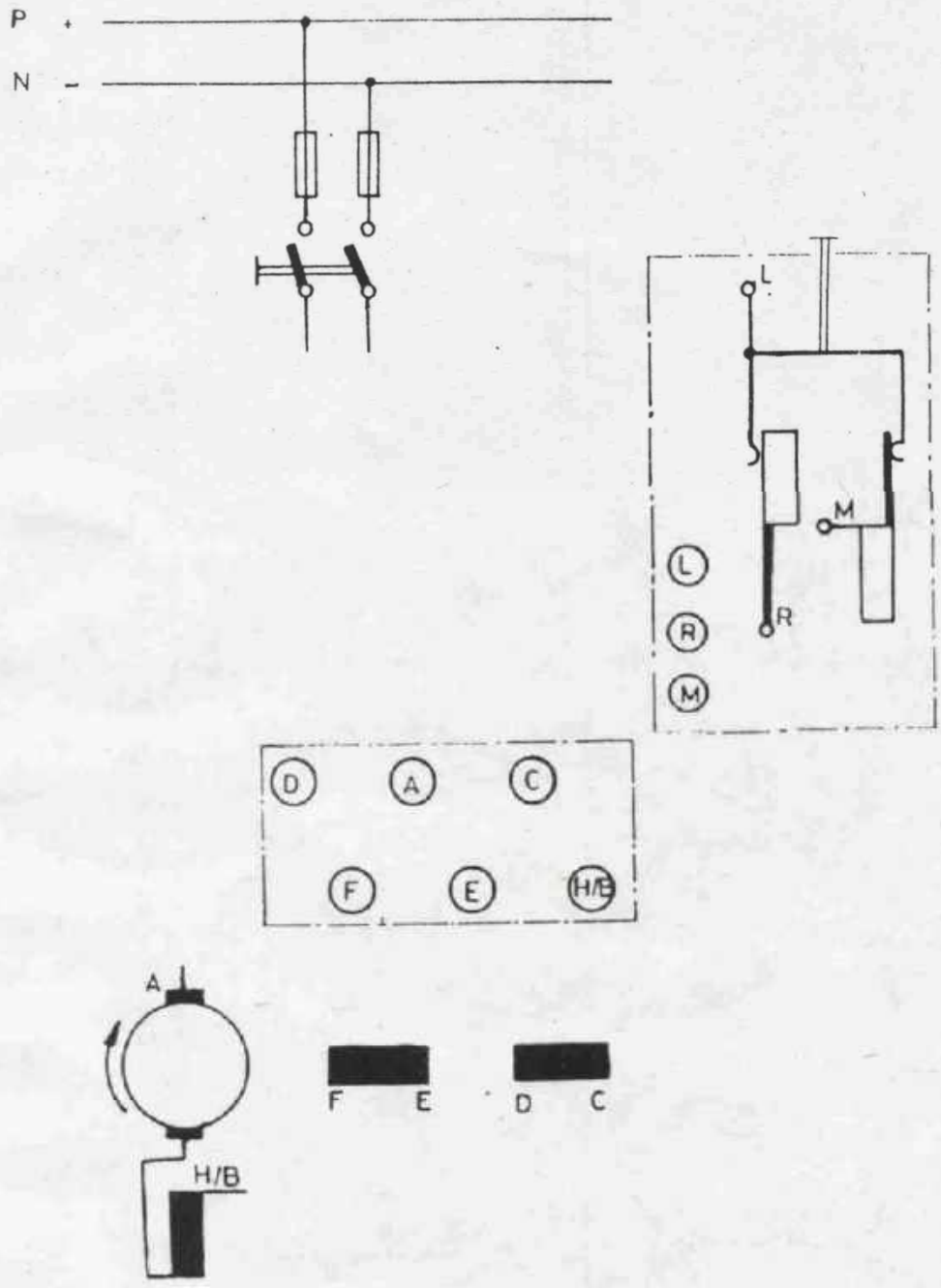
DC- COMPOUND MOTOR

TECHNICAL DRG No. 74

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

ELECTRICIAN GENERAL



Complete the internal and external connection of the compound motor including field regulator starter for clockwise rotation

	DC – COMPOUND MOTOR FIELD REGULATOR STARTER	TECHNICAL DRG. No. 75
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICAL GENERAL

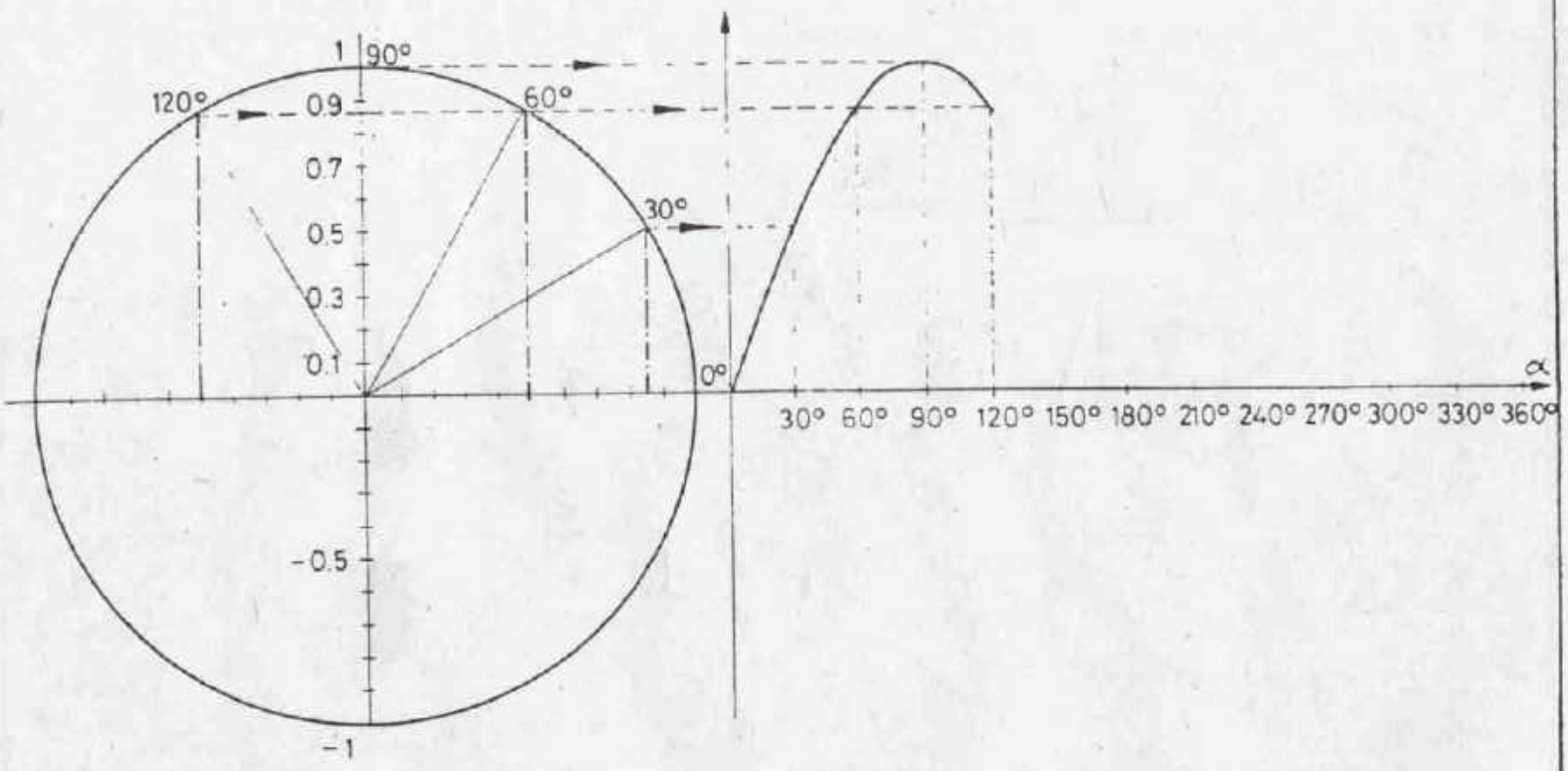
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

DEVELOPMENT OF A SINE CURVE

TECHNICAL DRG. No. 76

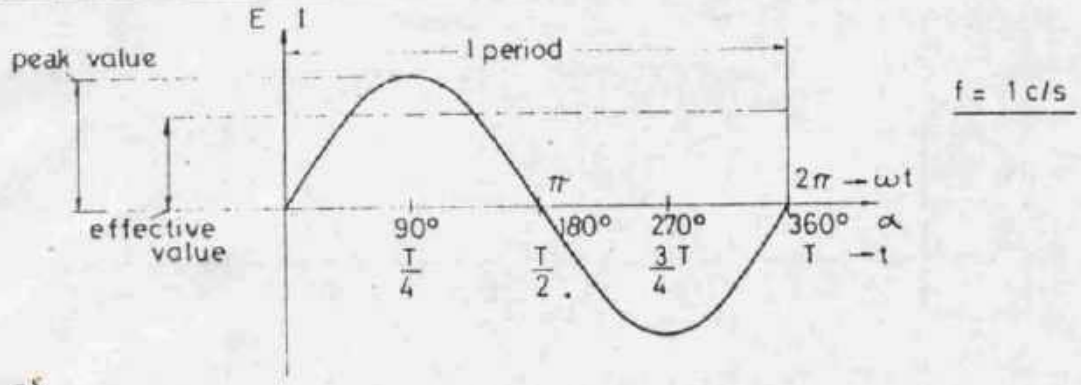
ELECTRICIAN GENERAL



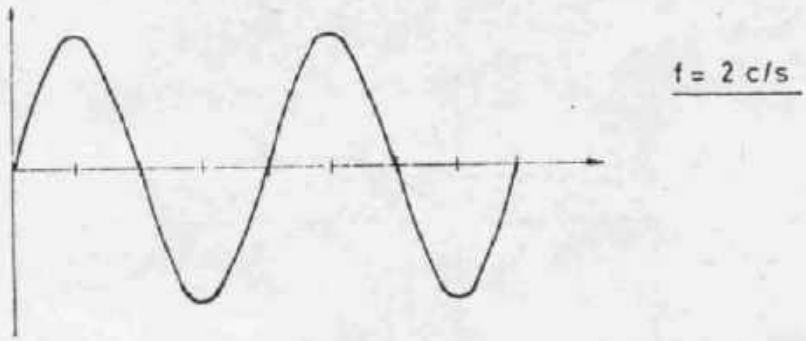
Complete one period of the sine curve, as it already has been done, up to the angle of 120°. The vertical line - - - - represents the sine of an angle in a triangle if the hypothenuse is "1".

The sine curve represents the shape of alternating current of electrical energy supply.

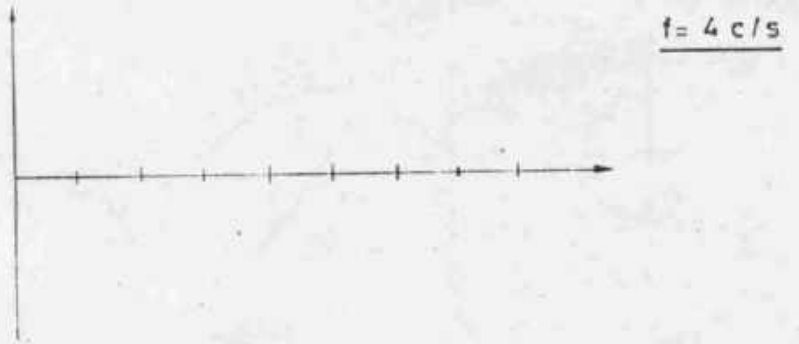
effective value $= \frac{\text{peak value}}{\sqrt{2}}$	$T = \frac{1}{f}$	360° el $= 2\pi$	$\omega = 2\pi f$



a)



b)

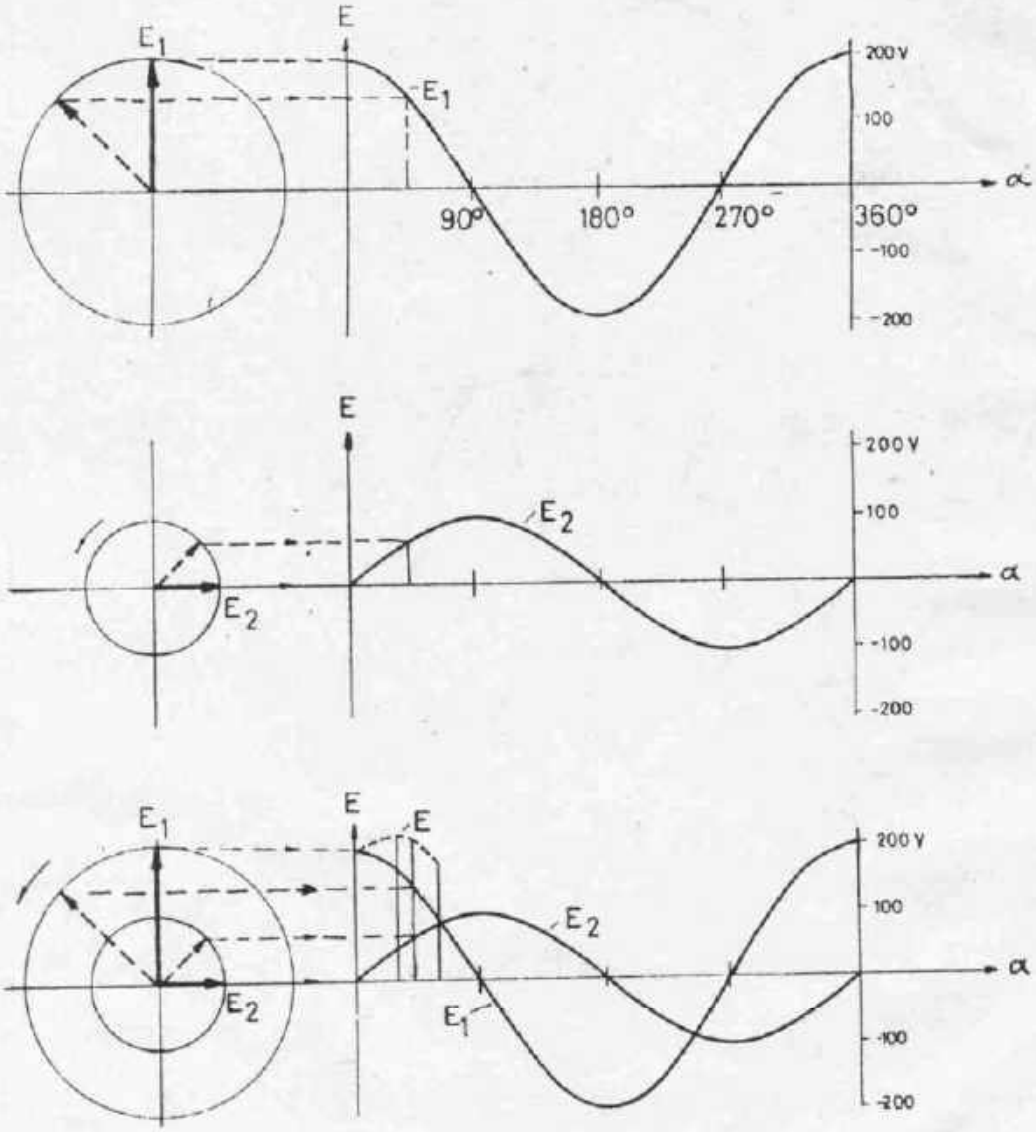


c)

Draw the sine curve for 4 c/s and designate the diagrams b) & c) as it has been done in a)

	DEVELOPMENT OF A SINE CURVE	TECHNICAL DRG. No. 77
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

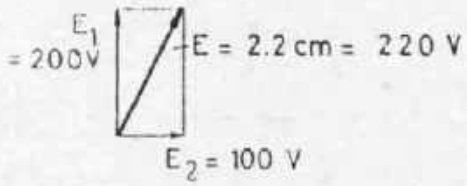
Voltages of different phase positions are added geometrically to get the total voltage. In the following case voltage E_1 leads voltage E_2 by 90°.

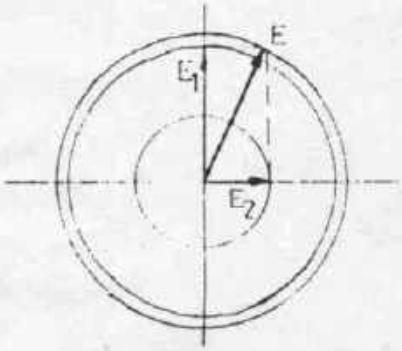


Construct the curve of the total voltage E by the addition of several values of momentary voltages E_1 plus E_2.
Scale: 1cm = 100 V.

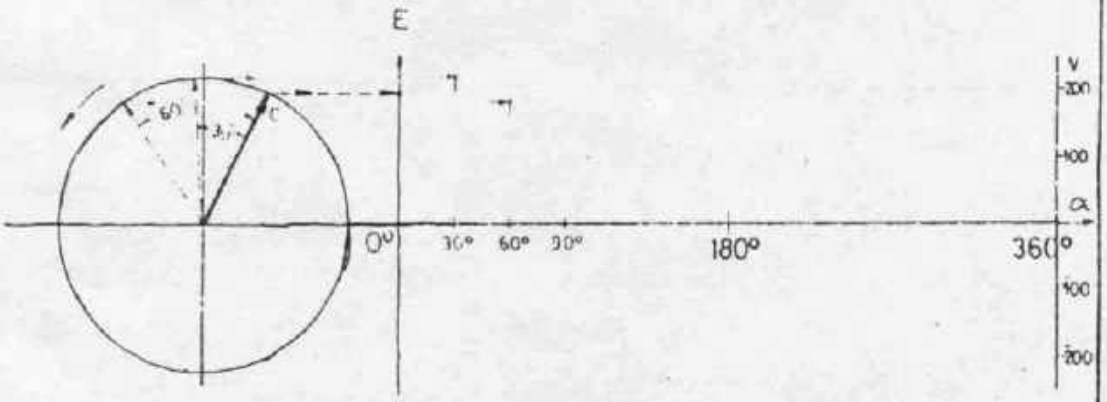
	VECTOR & LINE DIAGRAMS	TECHNICAL DRG. No. 78
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

The addition of two vectors yields the resultant vector.
The result of two phase displaced voltages E_1 and E_2 is the total voltage E.
Scale: 1 cm = 100 V





The projection of the rotating vector results in the line diagram



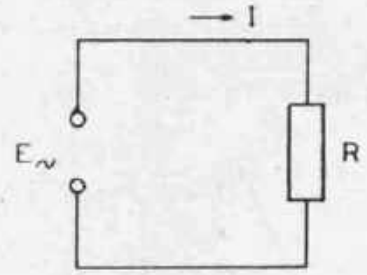
COMPLETE THE LINE DIAGRAM!

	VECTOR & LINE DIAGRAMS	TECHNICAL DRG. No. 79
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

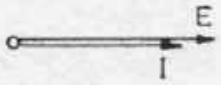
At ohmic load voltage E and current I are in phase.

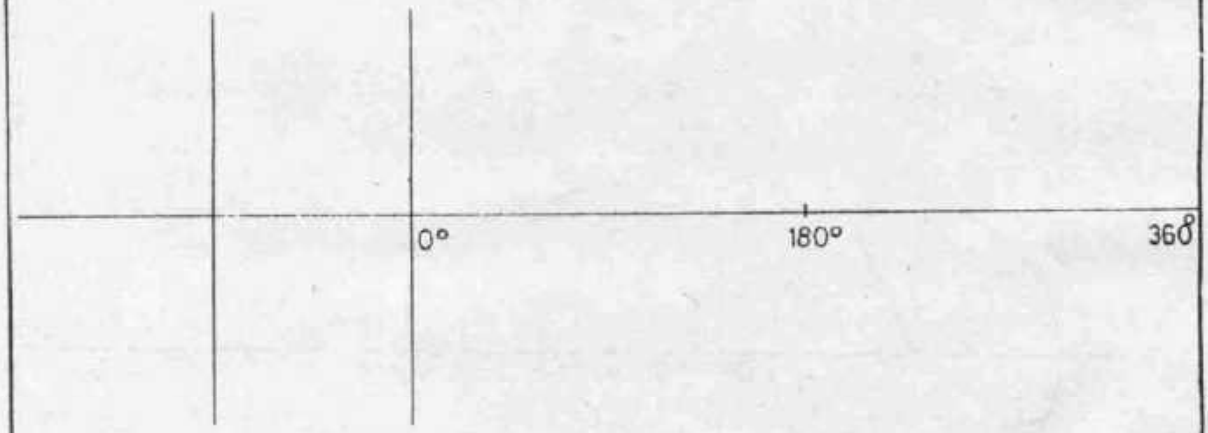
Given data of the circuit:

E = 120 V I = 5 A
(peak values)



Vector diagram

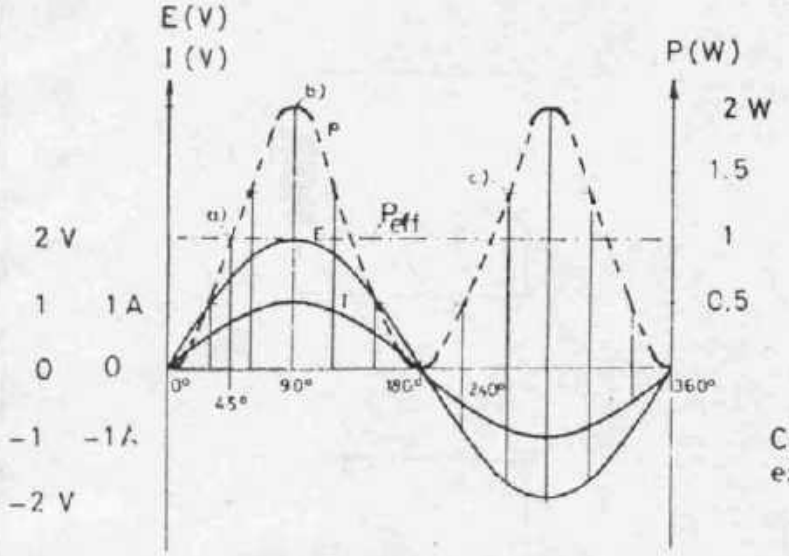




Draw vector and line diagram of the voltage and the current.
Select the scale: 1 cm = 40 V
1 cm = 2 A.

	REPRESENTATION OF I & E AT OHMIC LOAD	TECHNICAL DRG. No. 80
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

The power curve P is developed by multiplication of the instantaneous values of voltage and current.



Examples:

a) at 45°
0.7 A x 1.4 V = 1 W

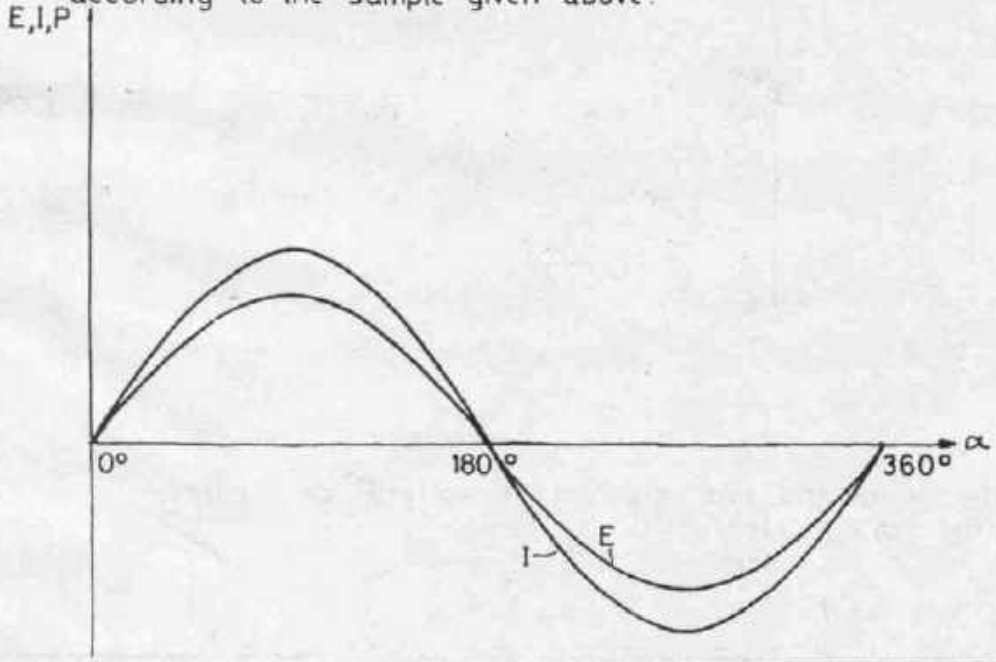
b) at 90°
1 A x 2 V = 2 W

c) at 240°
(−0.85 A)x(−1.6 V) = 1.35W

Check the results of the examples !

The power curve varies between its minimum value at 0°, 180° & 360° and its maximum value at 90° & 270°. The average value is a straight line with half of the peak to peak value. This is the value of the effective power.

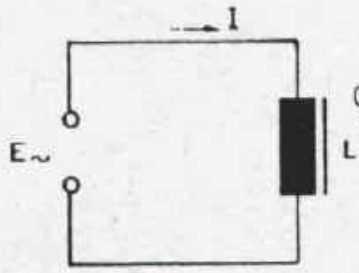
Develop the power curve for I = 2.8 A , E = 220 V (peak values) according to the sample given above.



	CONSTRUCTION OF A POWER CURVE out of I & E – OHMIC LOAD	TECHNICAL DRG. No. 81
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

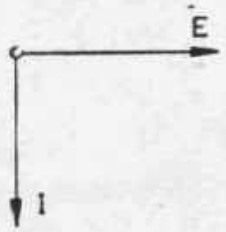
At inductive load voltage E and current I are phase displaced.
Voltage leads current by 90°

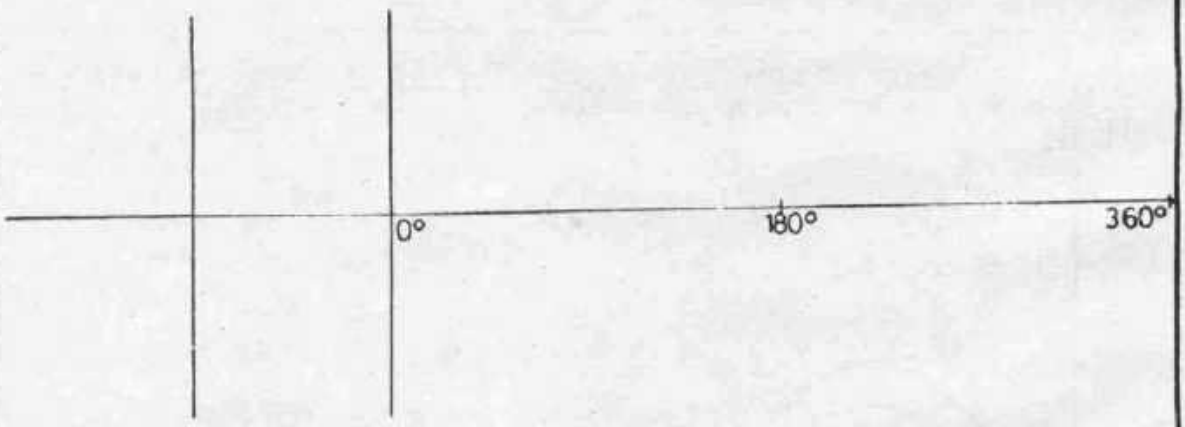
Given data of the circuit :
E = 120 V I = 5 A
(peak value)



Circuit with inductive load

Vector diagram

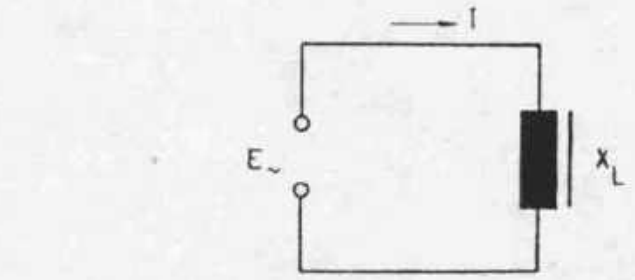


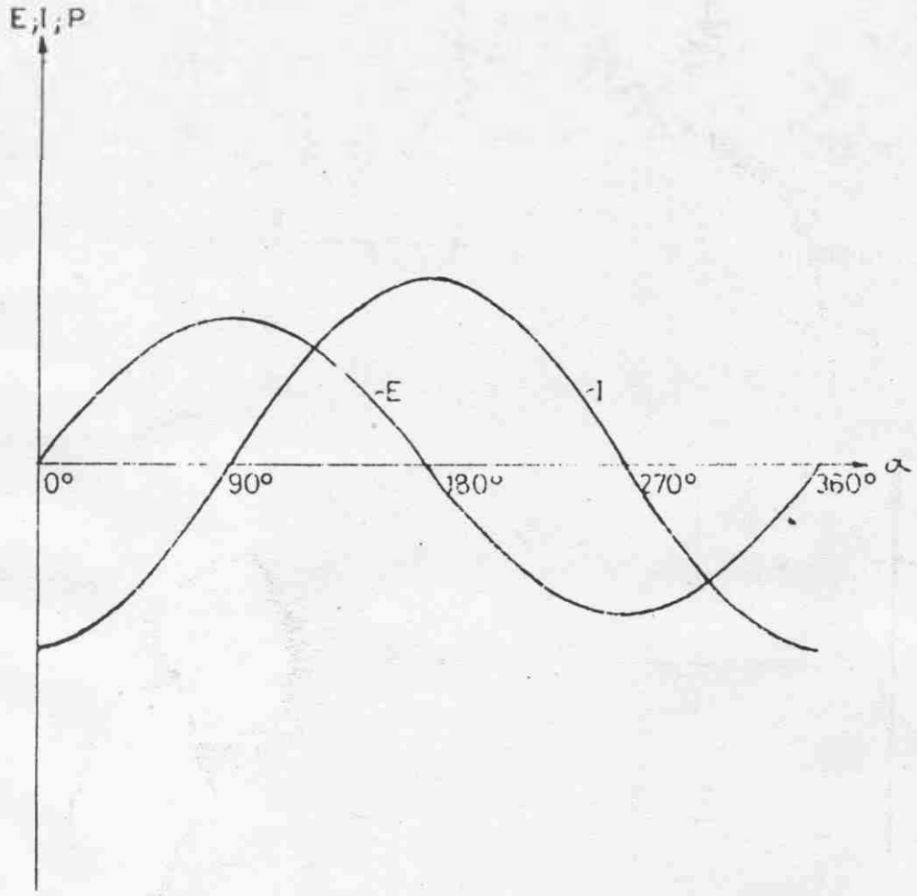


Draw the vector and line diagram of voltage and current
Select the scale : 1cm = 40 V
1cm = 2 A.

	REPRESENTATION OF I & E AT INDUCTIVE LOAD	TECHNICAL DRG. No. 82
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

Circuit with inductive load



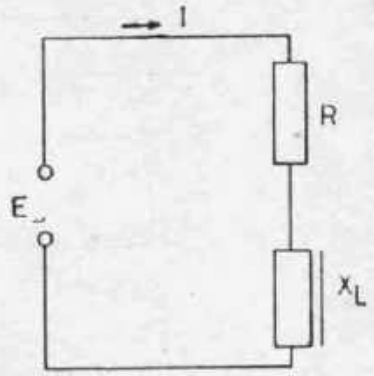


Develop the power curve out of the given current & voltage curves. I = 2.8 A ; E = 220 V (peak values)

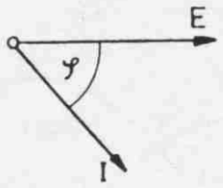
	CONSTRUCTION OF A POWER CURVE out of I & E – INDUCTIVE LOAD	TECHNICAL DRG. No. 83
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING	ELECTRICIAN GENERAL

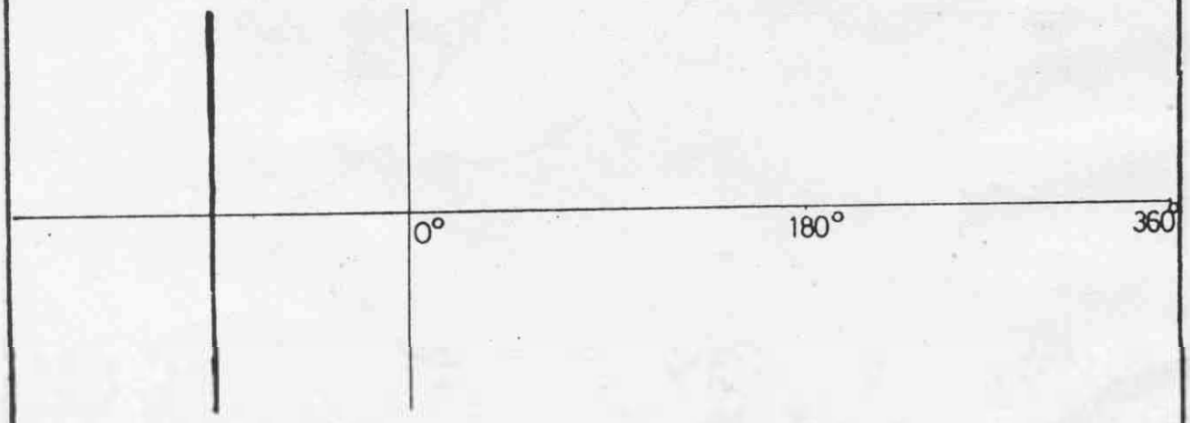
At ohmic plus inductive load voltage E and current I are phase displaced. Voltage leads current by an angle between 0° and 90°.

Given data of the circuit:
E = 120 V , I = 5A
(peak values)
phasedisplacement $\varphi = 45°$



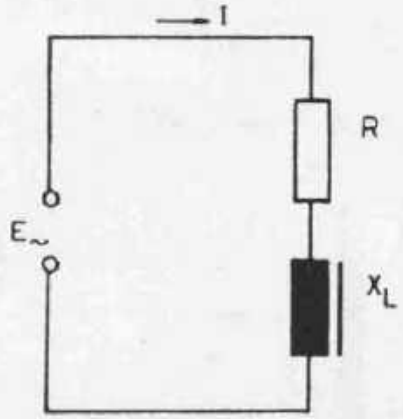
Vector diagram



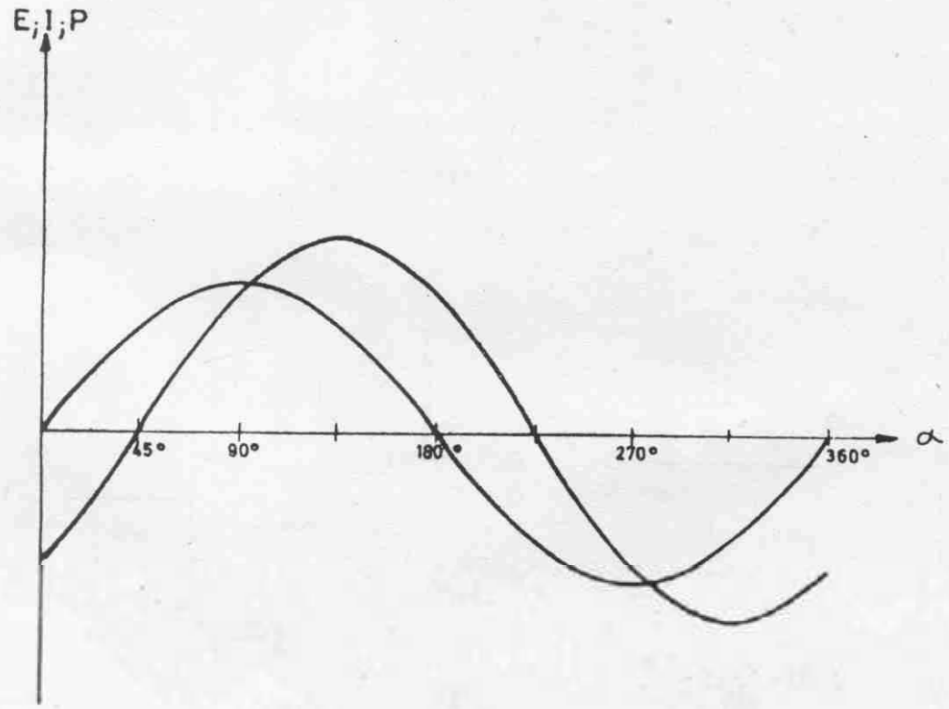


Draw the vector and line diagram of voltage and current.
Proposed scale 1 cm = 40 V
1 cm = 2 A

	REPRESENTATION OF I & E AT OHMIC PLUS INDUCTIVE LOAD	TECHNICAL DRG. No. 84
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

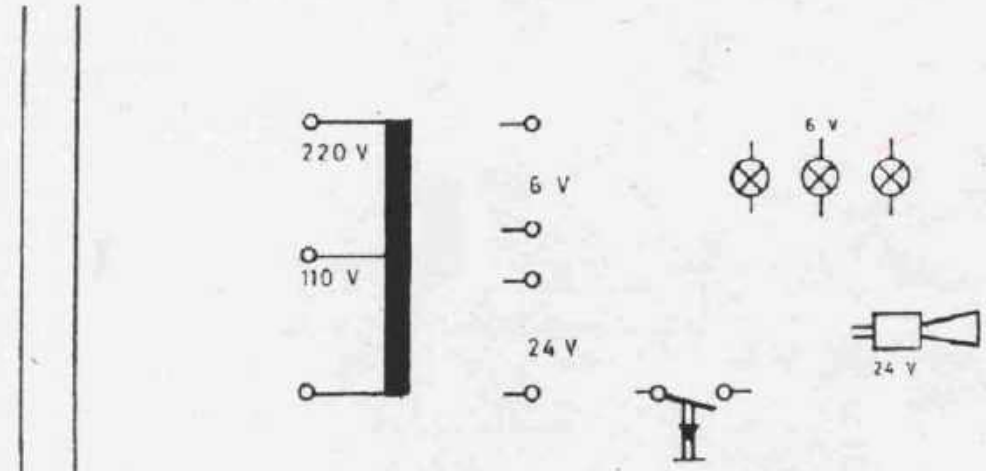


Circuit with ohmic and inductive load



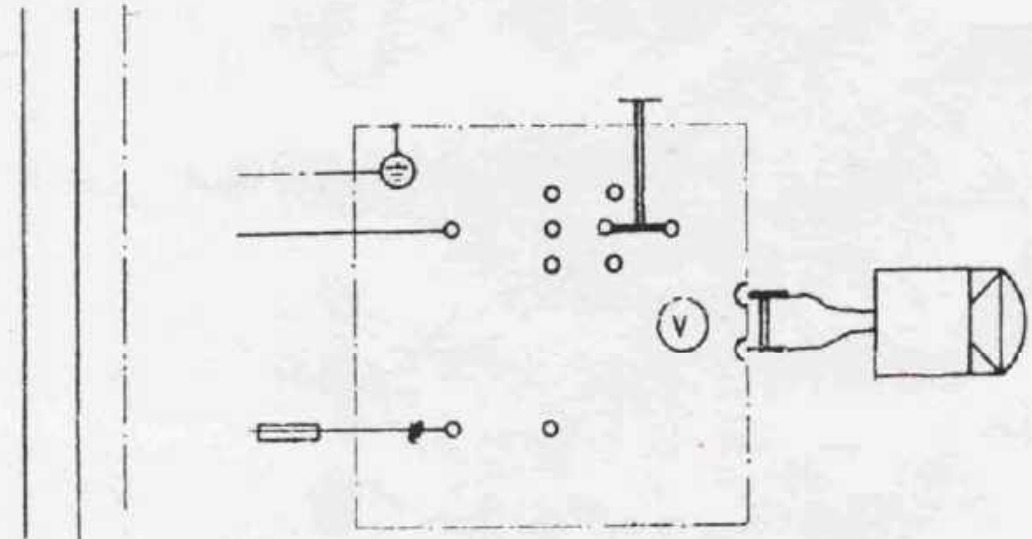
Develop the power curve out of the given current & voltage curve.
I = 2.8 A ; E = 220 V (peak values) ; phasedisplacement $\varphi = 45°$

	CONSTRUCTION OF A POWER CURVE —OHMIC plus INDUCTIVE LOAD	TECHNICAL DRG. No. 85
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	ELECTRICIAN GENERAL



R Mp

Secondary winding of this transformer consists of two seperate windings. Complete the drawing.



R Mp E

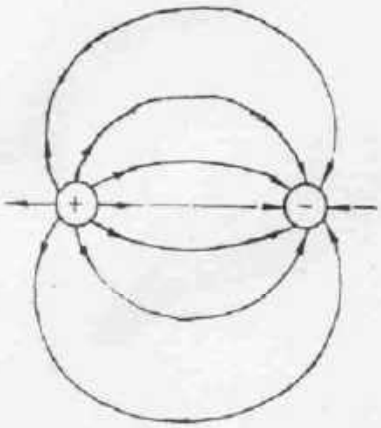
Fluctuations oi voltage can be compensated by an auto transformer Complete the drawing.

	CIRCUITS with TRANSFORMER	TECHNICAL DRG. No. 86
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME	ELECTRICIA GENERAL

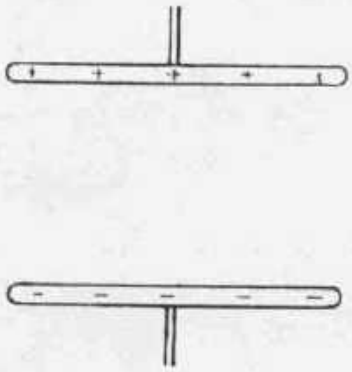
Where there is a potential difference between two points of an electric circuit, there will be an electric field. The field lines run from the positively to the negatively charged point or area as shown in example a).

Draw the electric fields for examples b) to d).

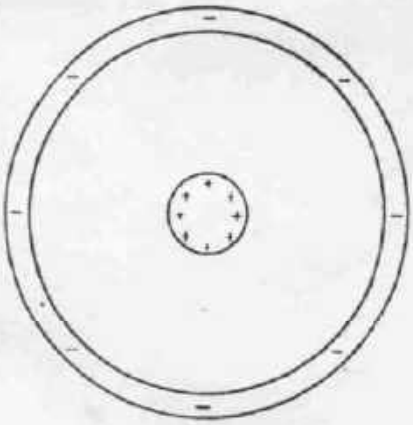
a)



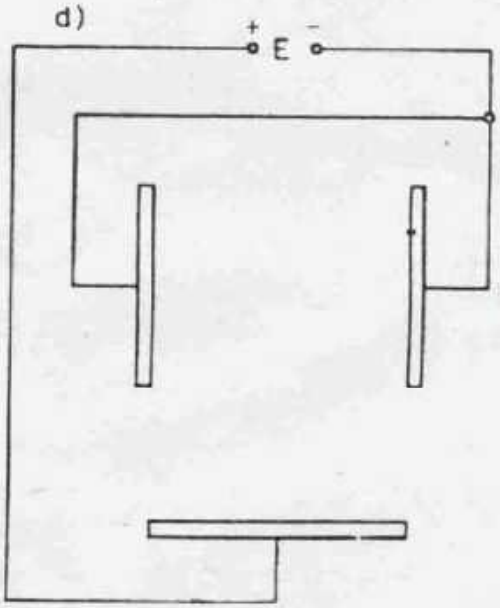
b)



c)



d)

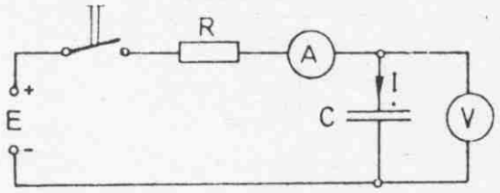


	THE ELECTRIC FIELD	TECHNICAL DRG. No. 87
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING. PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

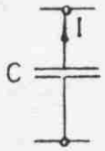
When charging a capacitor connected to a DC-source, a high current begins to build up a potential difference across the capacitor. After a certain time the p.d. reaches the value of the source-voltage while the current decreases to zero.

When discharging, the current flows back from the capacitor with a high initial rate while the p.d. decreases to zero.

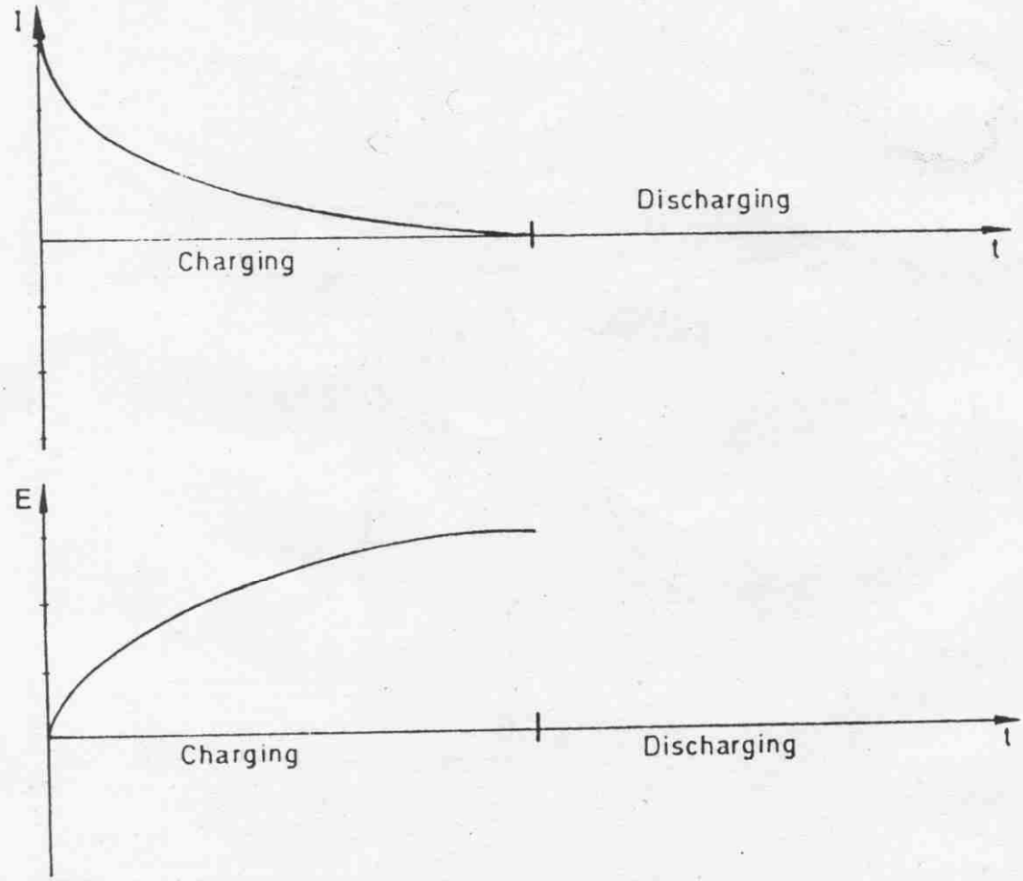
Complete the discharging connection-diagram and the line diagram for current and voltage.



Charging connection

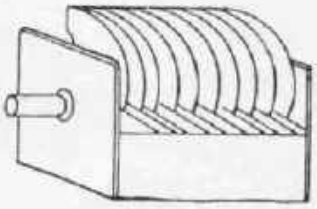


Discharging connection

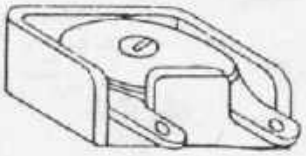


	CURRENT AND VOLTAGE OF A CAPACITANCE	TECHNICAL DRG. No. 88
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

VARIABLE CAPACITORS



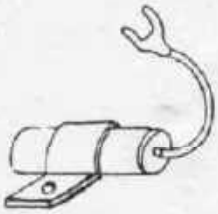
Air capacitor



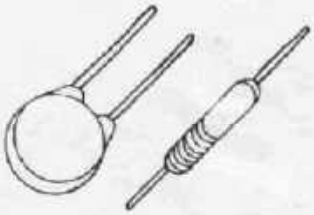
Mica capacitor

FIXED CAPACITORS

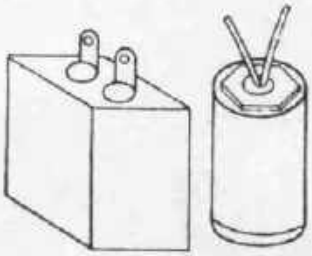
Molded paper cap.



Metal cased cap.



Ceramic cap.



Oil filled cap.

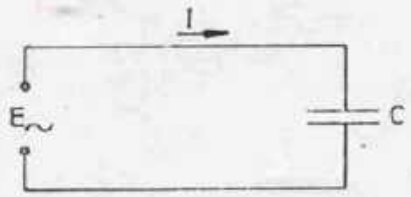
Electrolytic cap.

Draw the connection-diagram of four capacitors
for maximum capacitance: | for the maximum voltage to be applied.

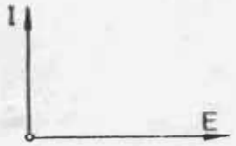
	TYPES OF CAPACITORS	TECHNICAL DRG. No. 89
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

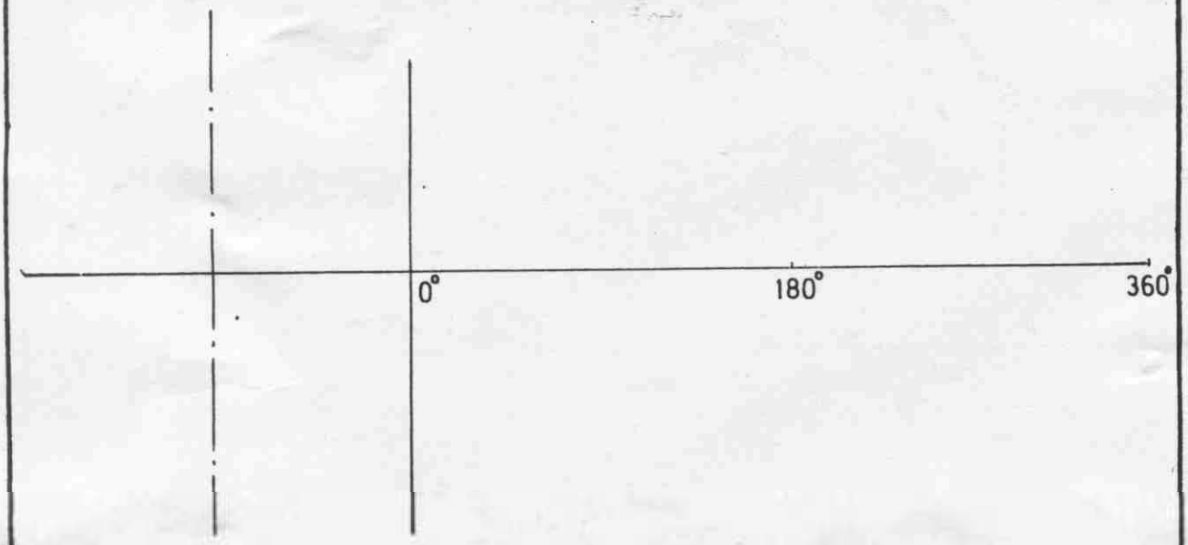
At capacitive loads connected to AC-supply current I and voltage E are phasedisplaced. The current leads the voltage by 90° (ideal capacitor).

Circuit with
capacitive load
E = 120V, I = 4A
(Peak values)



Vector diagram

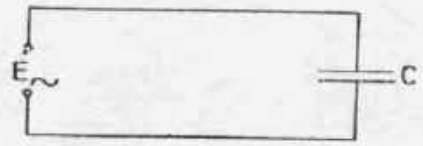




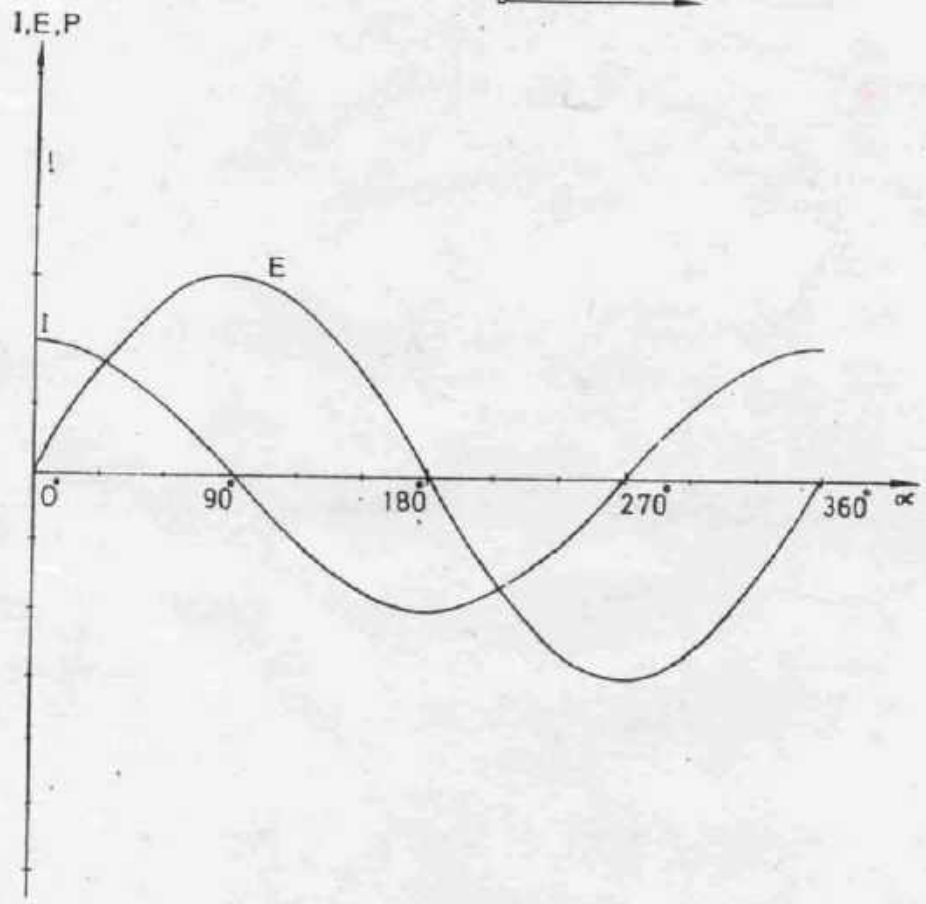
Draw the line-diagram of voltage and current.
Scale: 1cm = 40V
1cm = 2A

	REPRESENTATION OF I & E AT CAPACITIVE LOAD	TECHNICAL DRG. No. 90
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	ELECTRICIAN GENERAL

Circuit with capacitive load



Vector diagram



Develop the power curve out of the given current and voltage curves. Select a suitable scale for the power.

	CONSTRUCTION OF POWER CURVE OUT OF I & E	TECHNICAL ORG No. 91
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME	ELECTRICIAN GENERAL

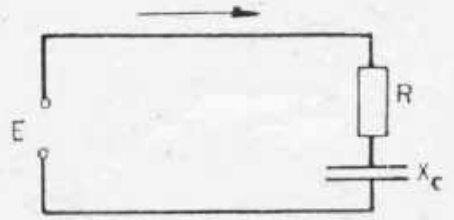
At ohmi plus capacitive loads current I and voltage E are phasedisplaced. The current leads the voltage by an angle between 0° and 90° depending on the ratio of R and X_c

Circuit with ohmic plus capacitive load

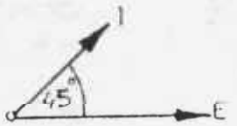
E = 120 V I = 4A

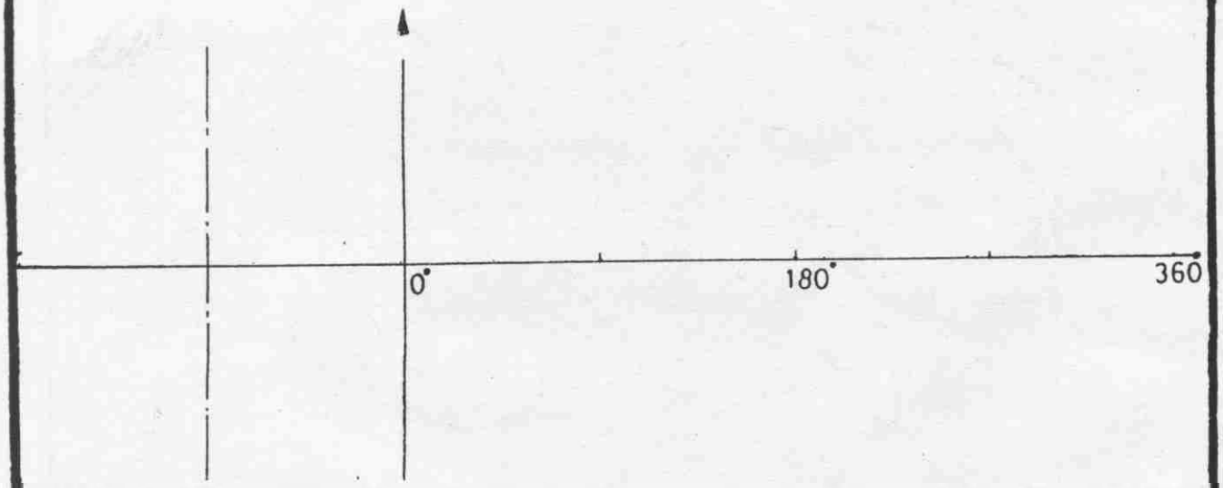
(peak values)

phasedisplacement $\varphi = 45°$



Vector diagram





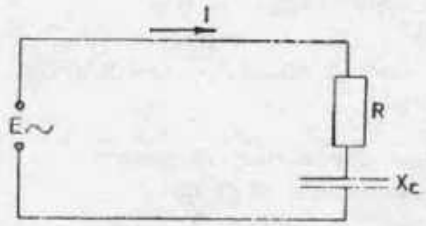
Draw the line-diagram of voltage and current

Scale : 1 cm = 40 V

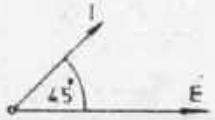
1 cm = 2 A

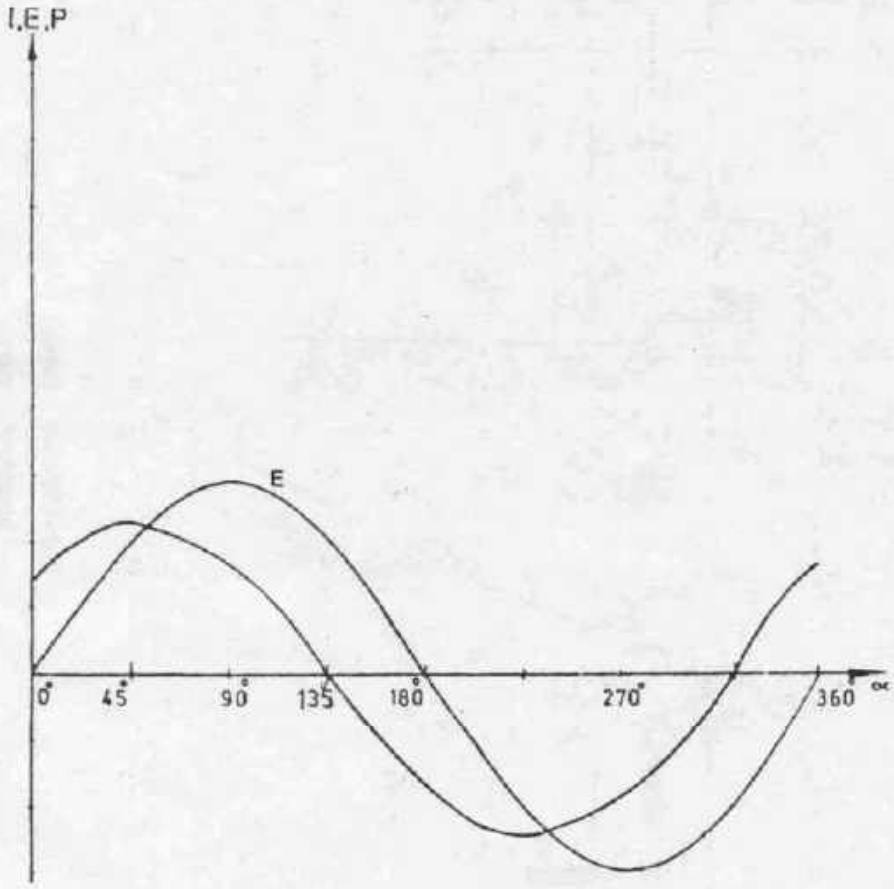
	REPRESENTATION OF I & E AT OHMIC PLUS CAPACITIVE LOAD	TECHNICAL DRG. No. 92
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING — TAX ... HUMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

Circuit with ohmic plus capacitive load.



Vector diagram



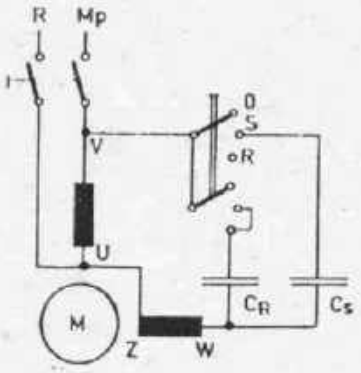


Develop the power curve out of the given current and voltage curve.
Select a suitable scale for the power.

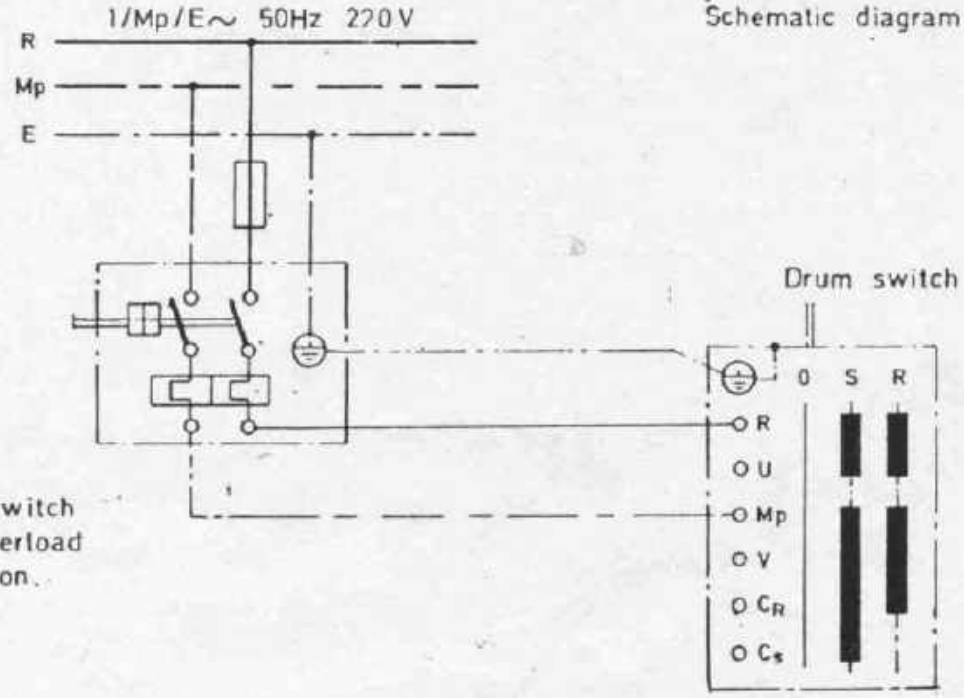
	CONSTRUCTION OF POWER CURVE FOR OHMIC PLUS CAPACITIVE LOAD	TECHNICAL DRG. No. 93
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

For a single-phase motor there is a starting capacitor C_s and a running capacitor C_R controlled by a drum-switch.

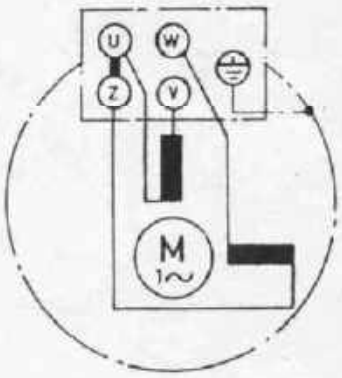
Complete the wiring diagram according to the schematic diagram.



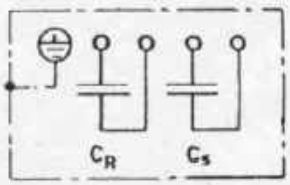
Schematic diagram



Main-switch with overload protection.



Motor

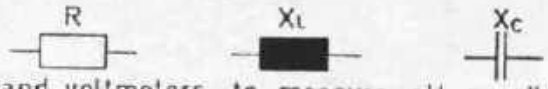


Capacitors

	CONNECTION WITH CAPACITORS - MOTOR STARTING DEVICE -	TECHNICAL DRG No. 94
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

In some devices a resistance, inductance and capacitance are connected in parallel (e.g. compensation of a motor by a capacitor with discharging resistor) or are connected in series (e.g. series compensation of a fluorescent lamp).

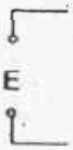
Draw the connection diagrams of a parallel connection and a series connection of the following components.



Draw ammeters and voltmeters to measure all possible currents and voltages.

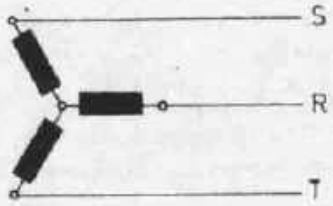
a) Parallel connection.

b) Series connection.

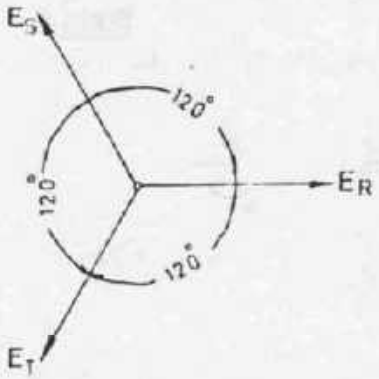


	CONNECTION OF RESISTANCE, INDUCTANCE AND CAPACITANCE	TECHNICAL DRG. No. 95
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

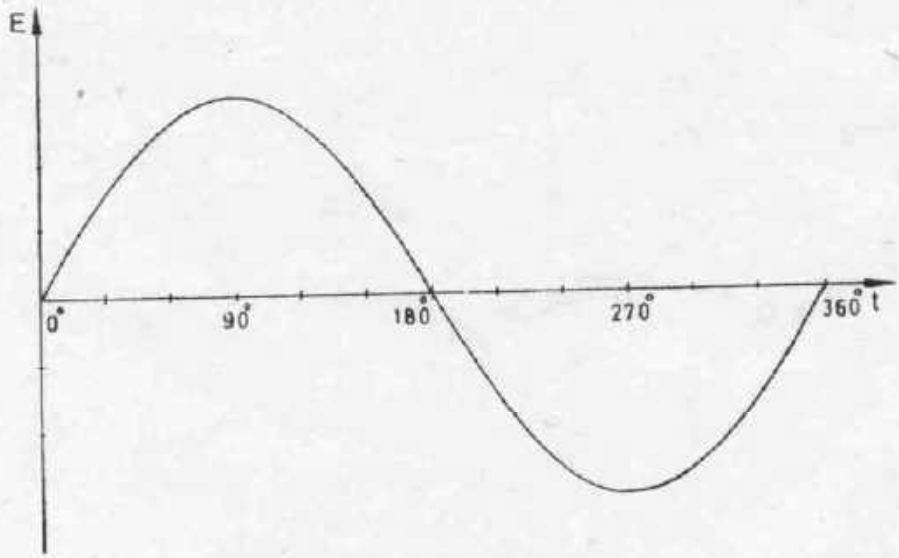
Connection of the three coils of a three-phase generator.



Vector diagram

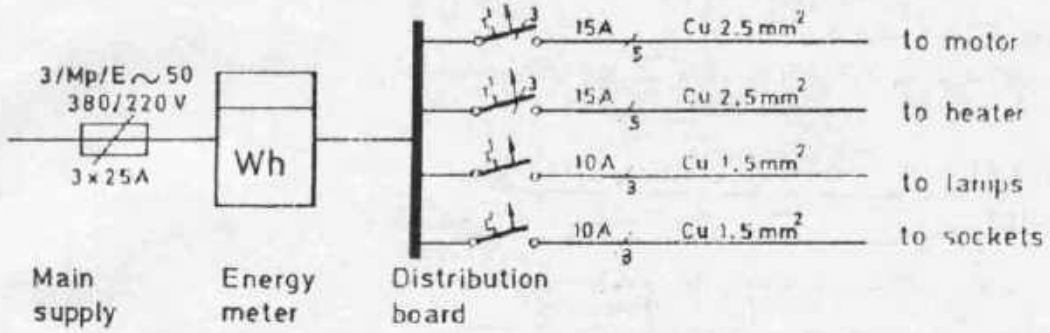


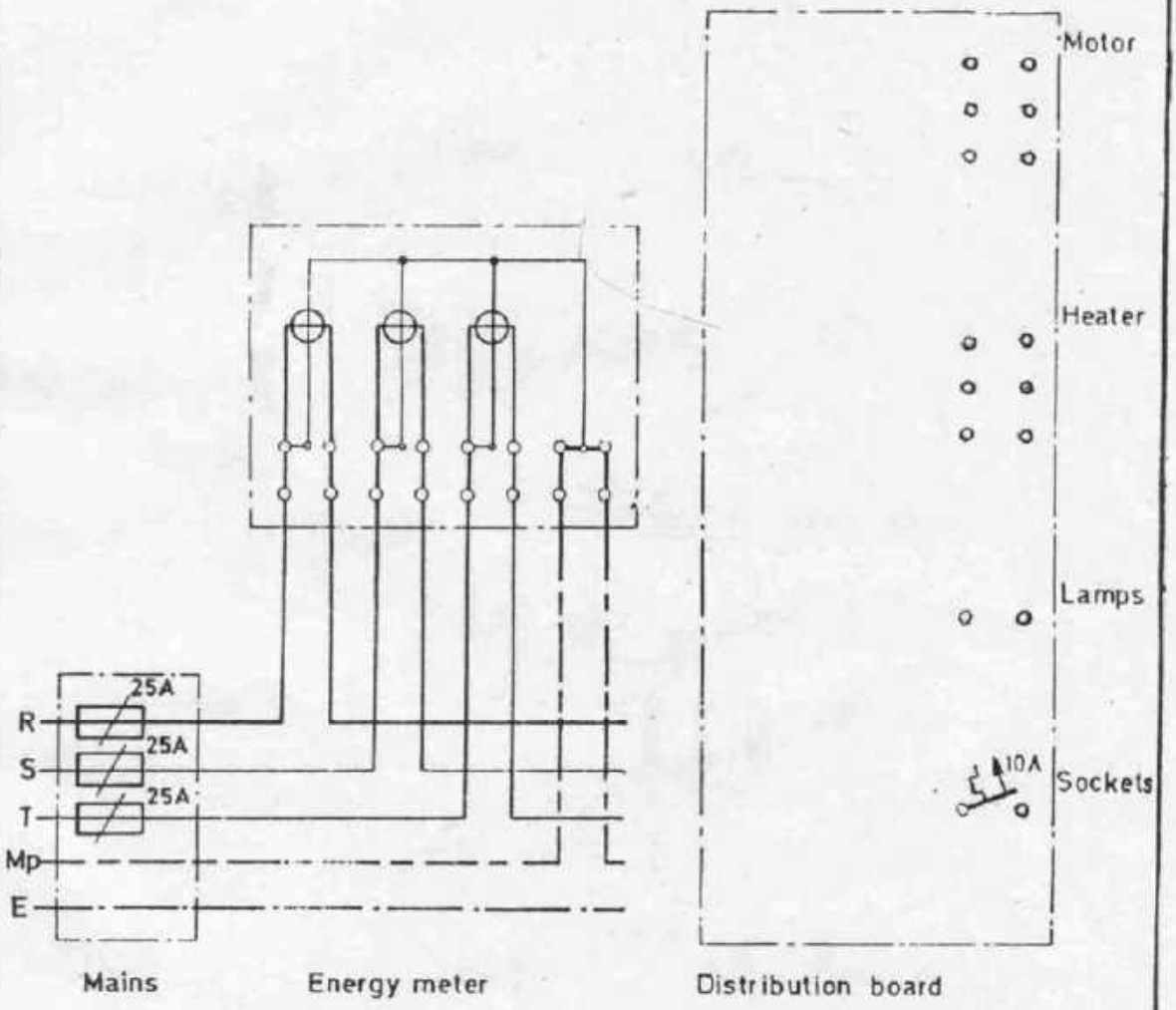
Draw the line-diagram of the voltages E_S and E_T.



	THREE-PHASE LINE-DIAGRAM	TECHNICAL DRG. No. 96
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

Complete the wiring diagram according to the lay-out diagram

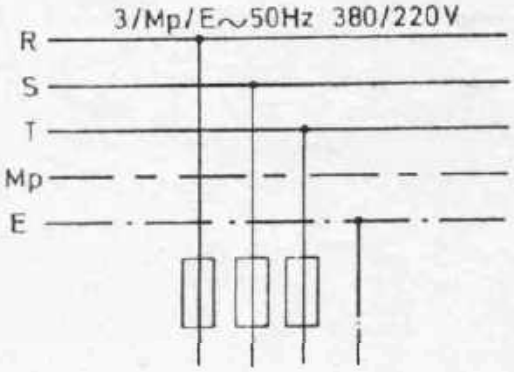


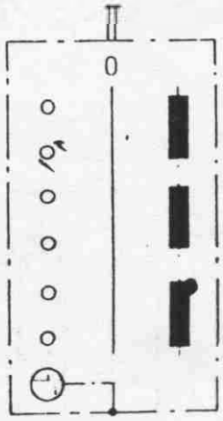


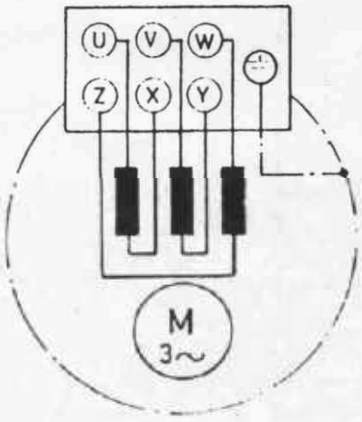
	THREE-PHASE DISTRIBUTION SYSTEM	TECHNICAL DRG. No. 97
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

A three-phase motor designed for a voltage of 380V, is controlled by a drum-switch.

Connect the motor coils in a delta-connection and complete the diagram.



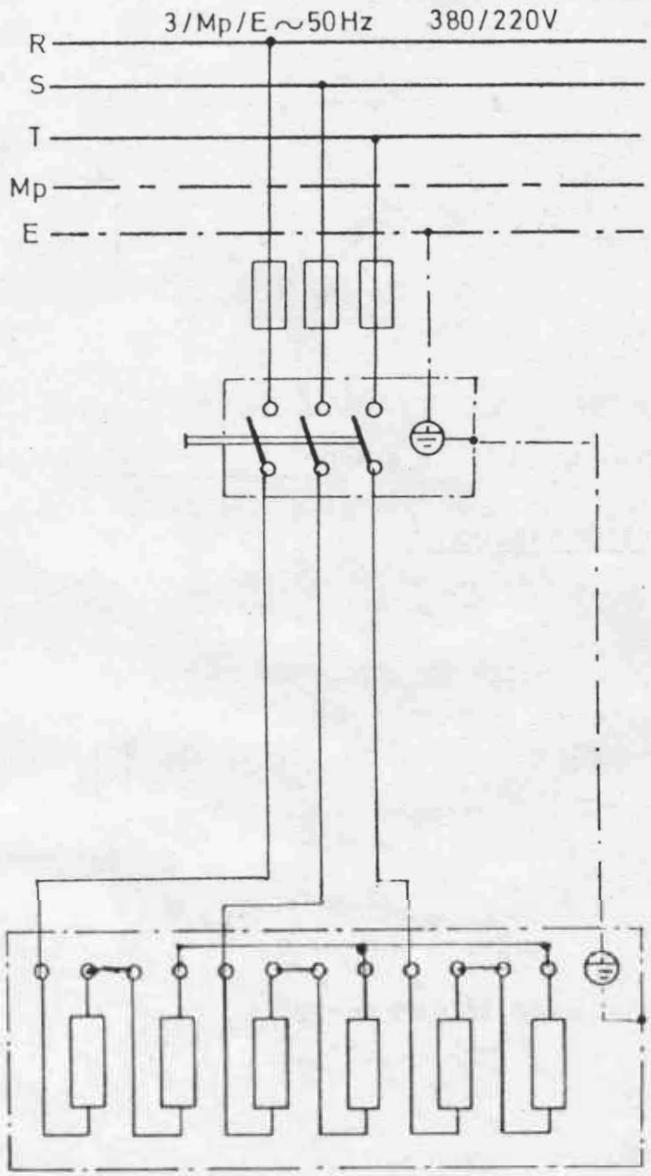




	MOTOR CONNECTION -DELTA CONNECTION-	TECHNICAL DRG. No. 98
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

In an industrial heater of 18 kW there are six heating resistors designed for 220V. The heater is to be connected to a three-phase 380 V supply.

Complete the connection diagram.

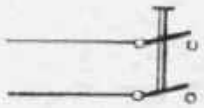


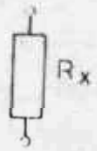
	HEATER CONNECTION - STAR CONNECTION -	TECHNICAL DRG. No. 99
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

To determine the resistance value of a resistor, current and voltage may be measured. To decide the appropriate connection of the ammeter and voltmeter, it is necessary to consider the measuring error involved.

Complete the diagrams below and decide which one is useful for determining high and low resistances.

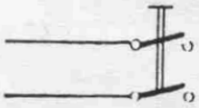
a) Voltage Fault Connection :

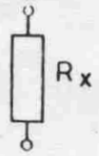




This hookup is used to determine _____ resistances.

b) Current Fault Connection :





This hookup is used to determine _____ resistances.

	DETERMINING RESISTANCE BY AMMETER AND VOLTMETER	TECHNICAL DRG No. 100
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

SYMBOLS ON MEASURING INSTRUMENTS

—	DC - measurements		Thermocouple
⎓	DC and AC - measurements		Moving coil ratiometer type
~	AC - measurements		Moving magnet instruments
≋	Three - phase measurements		Moving magnet instrument ratiometer type
1.5	Classification of accuracy		Moving - iron instrument
⊥	Operating position vertical		Moving - iron instrument ratiometer type
⌐	Horizontal position		Electrodynamic instrument
∠60°	Inclined position		Electrodynamic instrument Ratiometer type
☆2	Test - voltage in K V		Electrodynamic instrument Iron screened
○	Iron screening		Electrodynamic instrument Ratiometer, iron screened
○	Electrostatic screen		Induction instrument
ast	Astatic instrument		Induction instrument Ratiometer type
△	Refer to instruction manual !		Hot - wire instrument
	Zero adjuster		Bimetallic instrument
	Moving coil instrument		Electrostatic instrument
→+	Rectifier		Vibrating - reed instrument

Explain the details given in the three examples below

SYMBOLS ON MEASURING INSTRUMENT | TECHNICAL DRG. No. 101

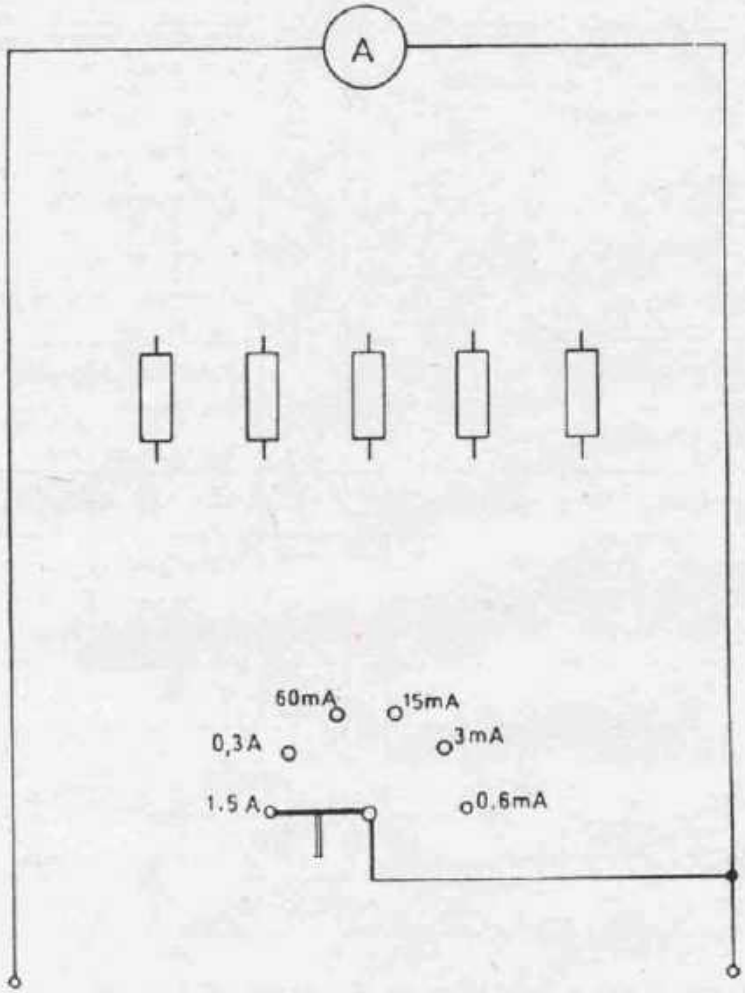
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

ELECTRICIAN GENERAL

A multi-range ammeter has five shunt resistors to provide for a total of six measuring ranges.

Complete the connection diagram of the meter.

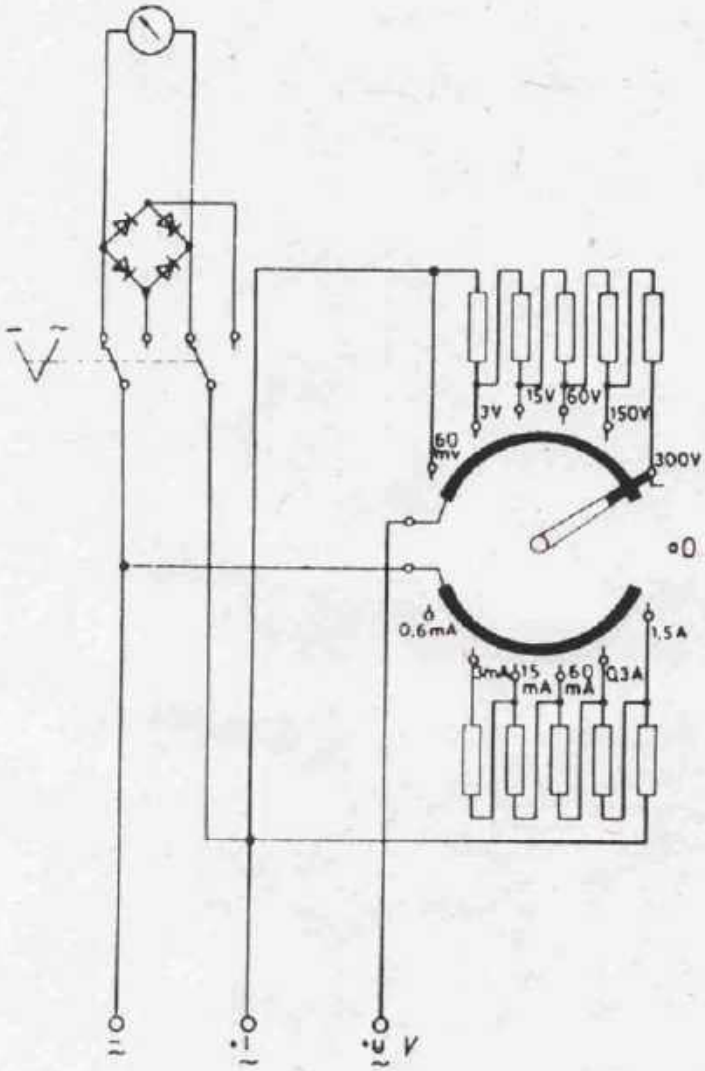


	MULTIRANGE AMMETER	TECHNICAL DRG. No. 102
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

The diagram below shows the diagram of a multimeter.

Mark with different coloured pencils the switch positions and current paths for the following measuring tasks :

a) DC - current up to 15mA
b) AC - voltage up to 300 V



	INTERNAL CONNECTION OF A MULTIMETER	TECHNICAL DRG. No. 103
	DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK GERMAN TECHNICAL TRAINING PROGRAMME	ELECTRICIAN GENERAL

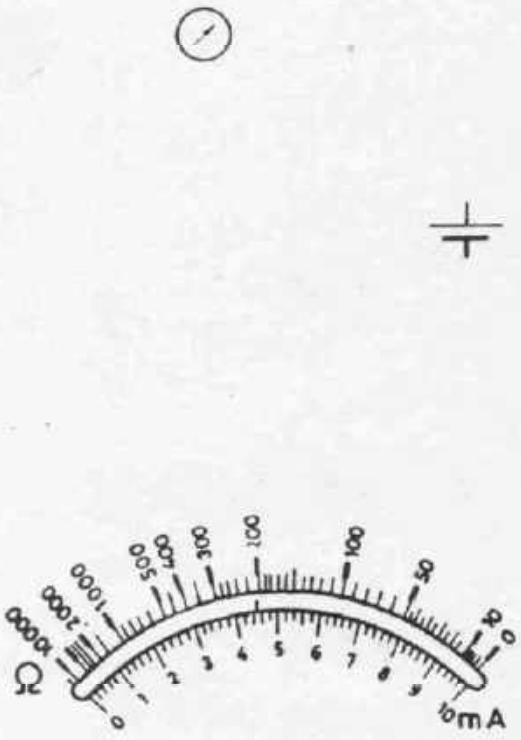
a) Direct reading ohmmeters are usually connected as a series connection of the unknown resistance Rx with the meter and a series resistor Rs.

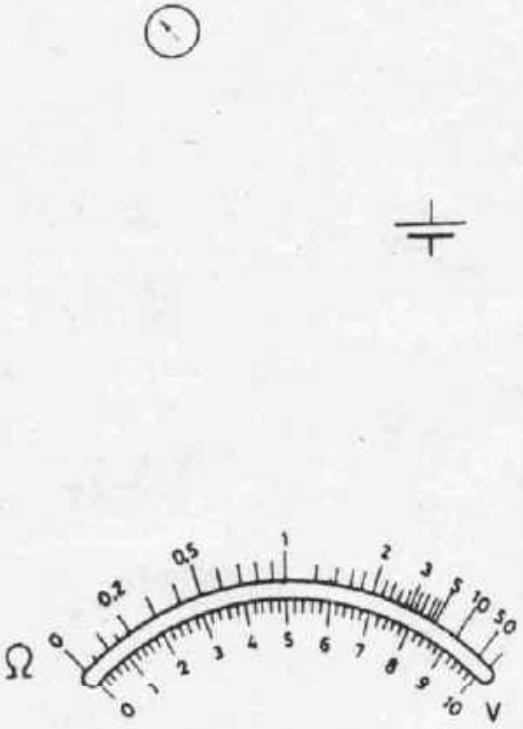
The resistance measurement is reduced to a current measurement. Origin of the scale is at right.

b) For measuring small resistances the unknown resistance Rx is connected in parallel to the meter (but both in series connection to Rs).

The resistance measurement is reduced to a voltage measurement. Origin of the scale is at left.

Complete the connection diagrams for both types.

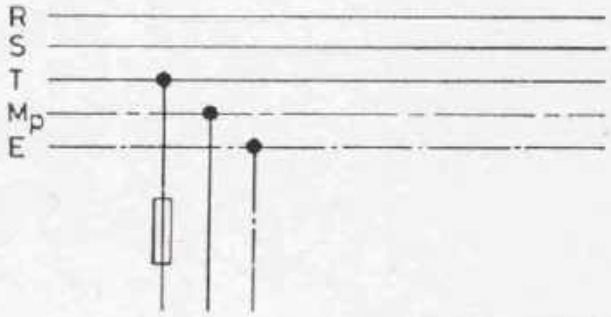


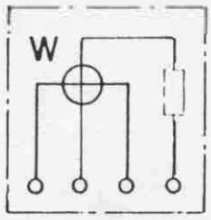


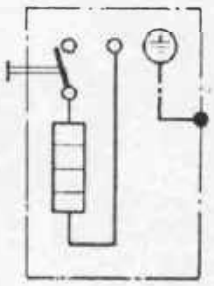
	INTERNAL CONNECTION OF OHMMETERS	TECHNICAL DRG. No. 104
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

A heating appliance is to be connected to a measuring set for power- current - and voltage measurement.

Complete the connection diagram.



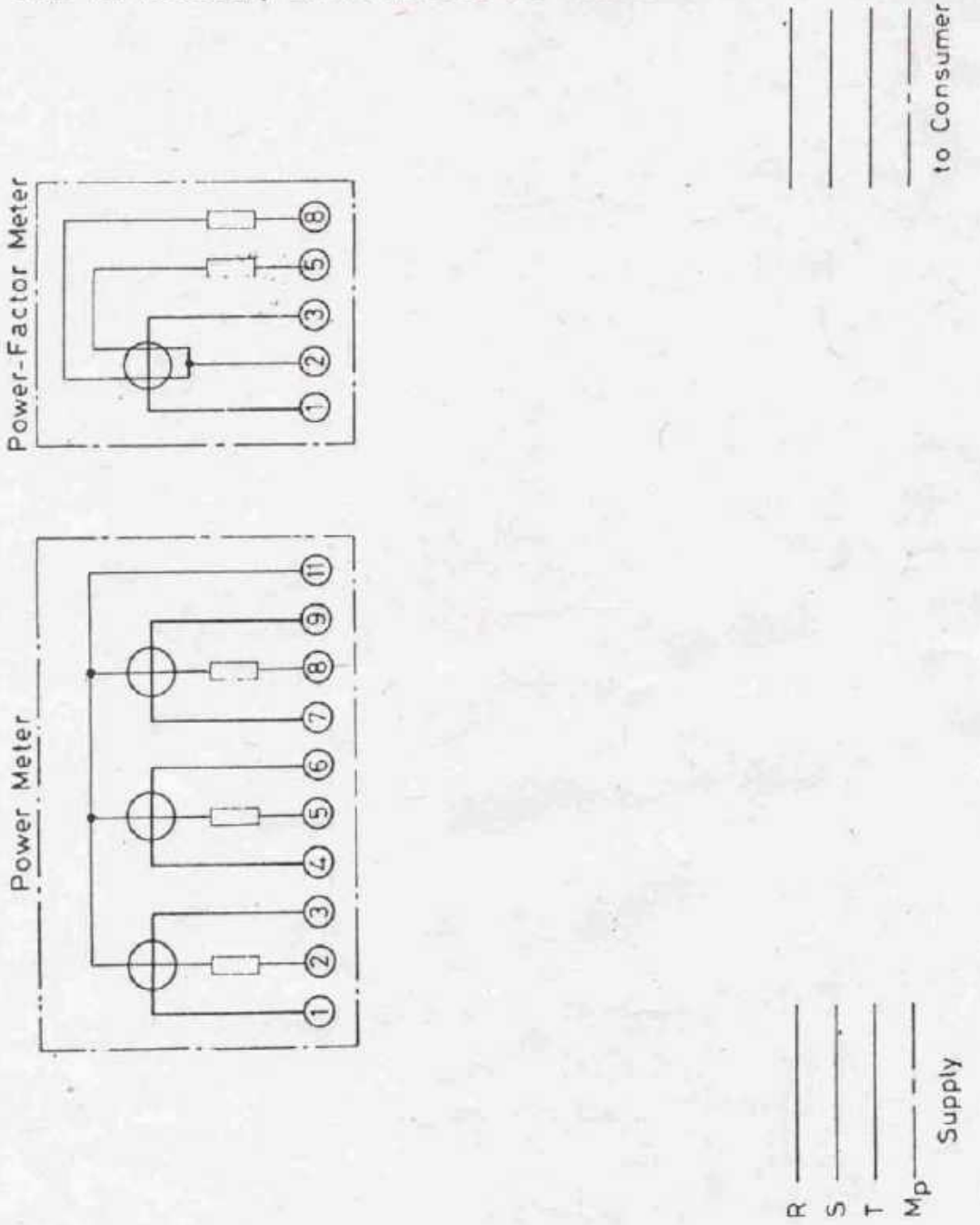




	POWER MEASUREMENT IN SINGLE PHASE SUPPLY	TECHNICAL DRG No. 105
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

In a three-phase system the power and power-factor of a consumer are to be measured.

Draw all necessary connections to the meters.

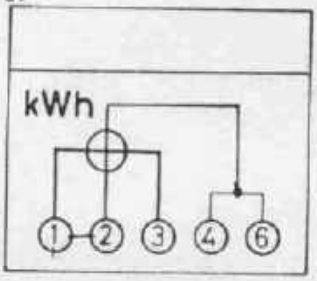


	POWER AND POWER-FACTOR METER IN THREE-PHASE SYSTEM	TECHNICAL DRG. No. 106
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

A distribution board is supplied through a single-phase energy meter. Connected to the distribution board there is a socket and a motor controlled by a protective switch.

Complete the wiring diagram with all necessary connections and fuses according to the lay-out diagram.

Energy meter



R

M_p

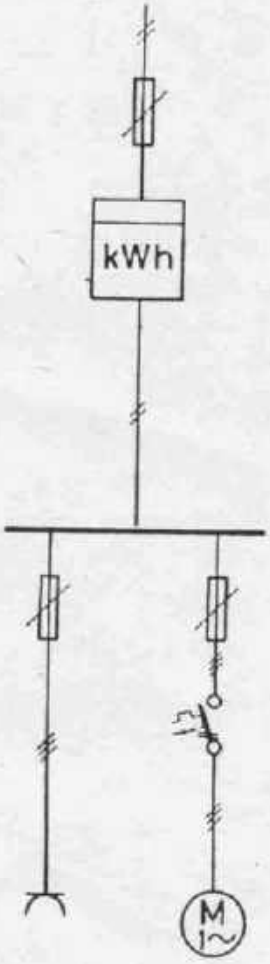
Supply

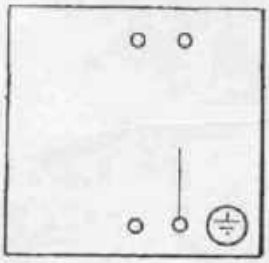
Distribution board

R

M_p

E

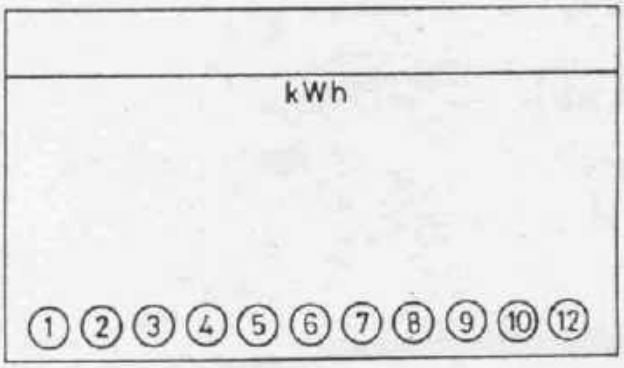




	ELECTRICITY METER IN SINGLE PHASE SUPPLY	TECHNICAL DRG. No. 107
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL

In a three-phase system the consumption of electric energy is to be measured.

Draw all necessary connections.

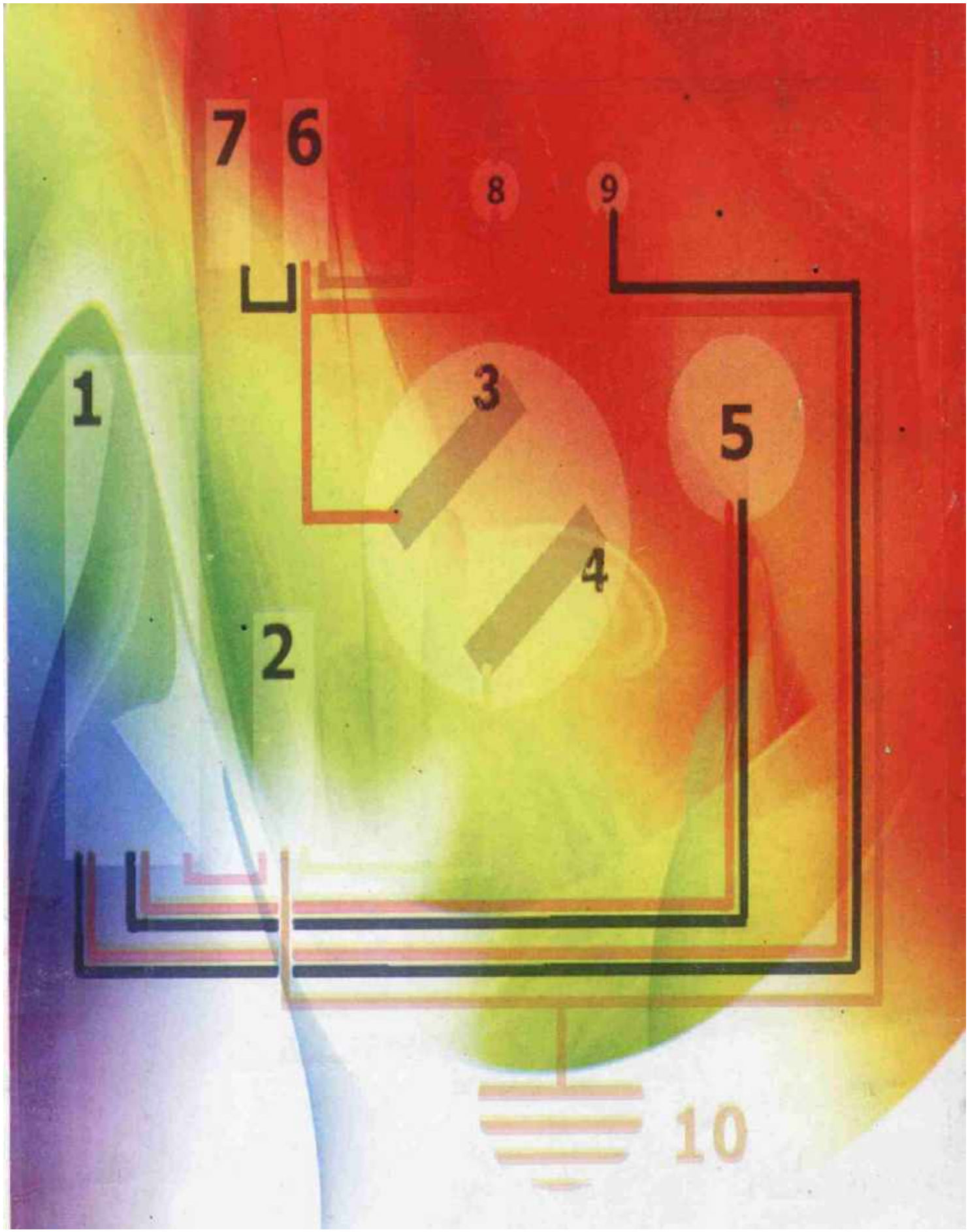


R
S
T
Mp

Supply

to Consumer

	ELECTRICITY METER IN THREE PHASE SUPPLY	TECHNICAL DRG. No. 108
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING PAK-GERMAN TECHNICAL TRAINING PROGRAMME		ELECTRICIAN GENERAL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