Technical description
Simplatron Controllers 471 - 475

Lenze

The Simplatron-47o-range comprises five 1-quadrant controllers with powers between 1,3 and 13 kW of compact design.

1. Special Features

Compact single control board units with potential-free heat sink
Mains isolation through current transformer
Operation with tachometer or with armature voltage feedback with I x R compensation
Self-synchronisation of the phase shifter with 5o or 6o Hz mains.
Highest possible interference protection by means of fitted synchronizing filter
Pulse series control in the power section
Highest safety in operation is obtained through fitted static and dynamic voltage surveillance
Operational display via LED's
Freely adaptable control points for set-value delay (471, 472: C2o3, 473÷475:C3o5), actual value differential element, speed-controller- readjusting time (dimensioning see service instructions)
Set-value integrator may additionally be equipped with subprint 2oo3

2.- Technical data:

Unit		471	472		473	474	475	
output	Pel	1,3	2,5	4	7	9	13	kW
mains voltage L1,N 5o÷6oHz L1, L2	U	19o ÷ 265			19o ÷ 265 34o ÷ 46o			V V
field voltage	U_F	o,9 x $U_{L1,N}$						V
field current	I_F	o,8	1,5		3			A
armature voltage	U_A	16o			26o			V
armature current	I_A	8	16		27	35	5o	A
form factor without choke	F_F	1,4						
with choke		1,2	1,2		1,2	1,2	1,2	
current limit	I_{max}	o÷8	o÷16		o÷27	o÷35	o÷5o	A
Nom.Master Voltage	U_{LN}	1o ÷ 18o						V
Nom.Tacho Voltage	U_{TN}	1o ÷ 18o						V
min.speed	n_{min}	-o,1 ÷ o,25						n_N
Fuse Power Section art.No.	S_i	2xFF16A/6ooV 1ox38 3o9 1o6		2xFF25A/6ooV 14x51 3o7 959		External fuse (see accessories)		
Fuse Electronics art.No.	S_i			1xFF4A/5ooV 6,3x32 3o8 o54		1xFF8A/5ooV 6,3x32 3o7 213		
temperature range	T_u	o÷45						°C
Set-value potentiometer	R_1	1o kOhm/1 WLin.						

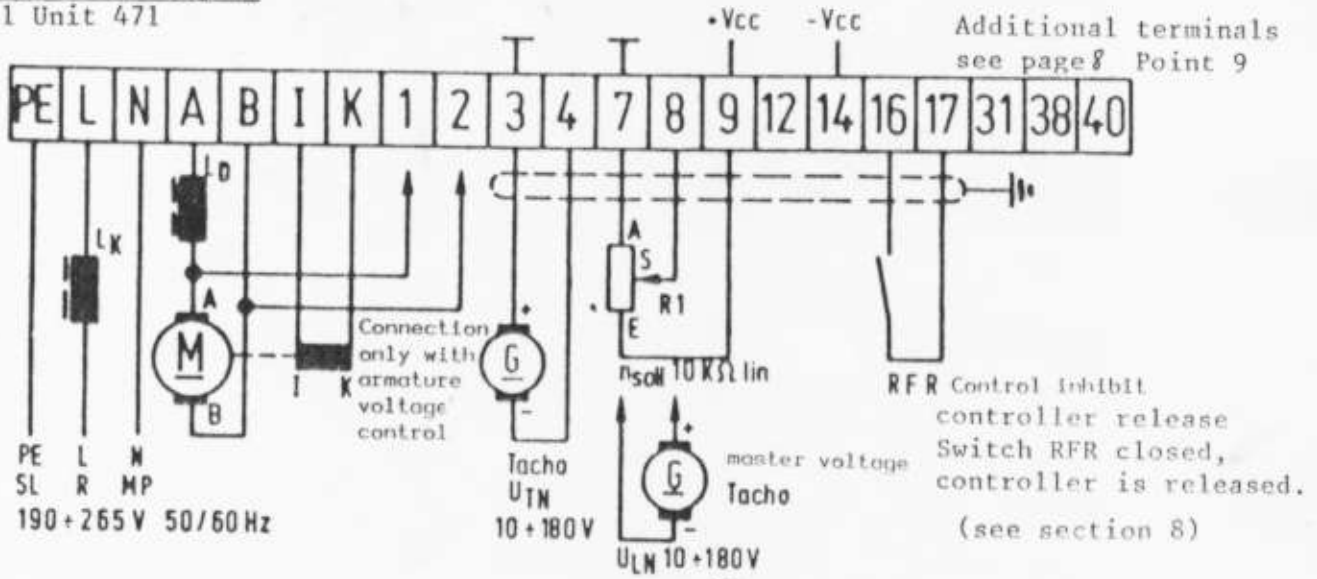
Bearb. DRAWN	EK15/GK 10.6.81	Lenze GmbH & Co KG Aerzen, 3250 Hameln	Zeichnungs-Nr. Drawing-No.
Geprüft checked			MB 33.0650 c 1 GB

Änderung modific. 23.08.1993

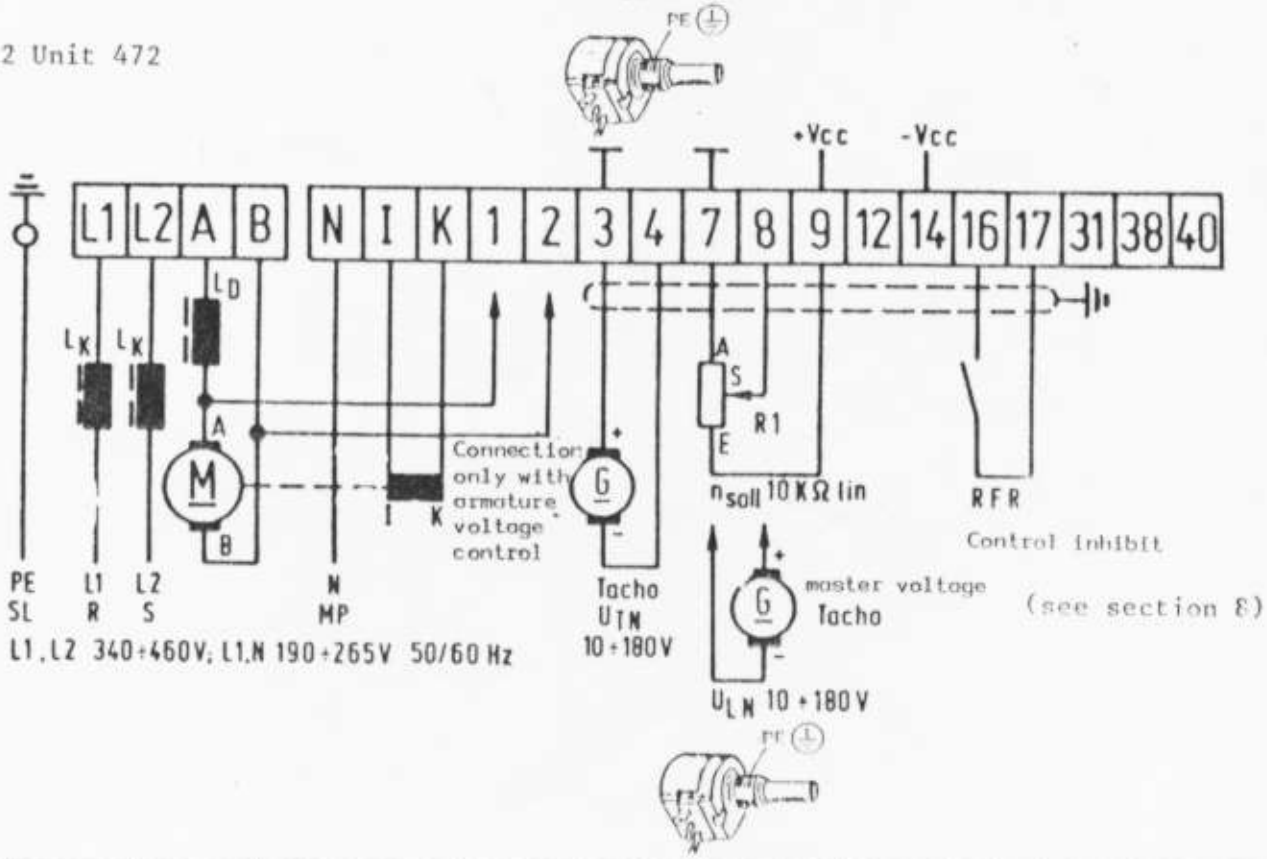
Unit	471	472	473	474	475	
Weight approx.	1,2	2,1	2,8	3,7	4,8	kg
control board art.No.			4o73 32o 382			
Chassis unit E art.No.	32o 377	32o 378	32o 379	32o 38o	32o 381	
Accessories (to be ordered separately)						
recommended mains fuse art.No.			2xFF40A/6ooV 22x58 3o7 175	2xFF5oA/6ooV 22x58 3o7 173	2xFF8oA/6ooV 22x58 3o7 174	
Fuse holder art.No.			2x 3o8 291			

3 Connection diagram

3.1 Unit 471

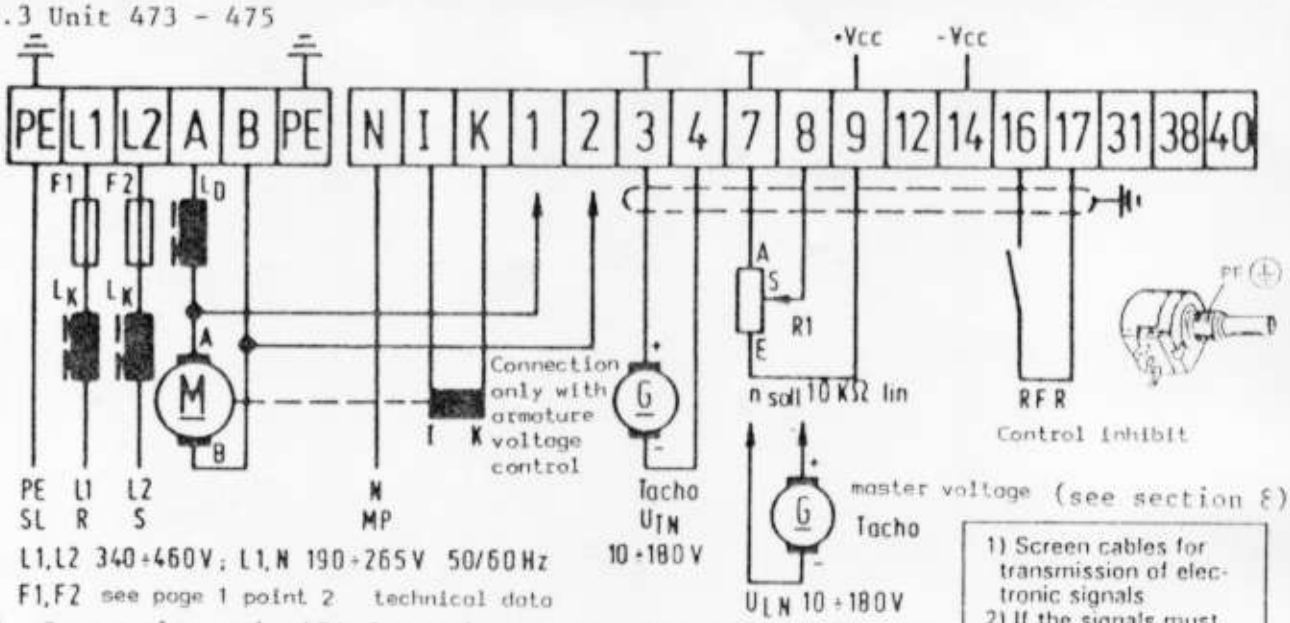


3.2 Unit 472



Bearb. DRAWN	EK15/GK 10.6.81	Lenze GmbH & Co KG Aerzen, 3250 Hameln	Zeichnungs-Nr. Drawing No.
Geprüft checked			MB 33.0650 c 2 GB

3.3 Unit 473 - 475

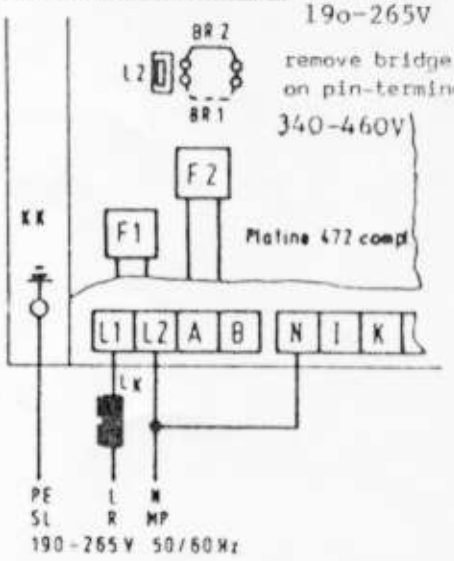


L1,L2 340÷460V; L1,N 190÷265V 50/60Hz

F1,F2 see page 1 point 2 technical data

1) Screen cables for transmission of electronic signals
2) If the signals must be changed-over via relays, use suitable relay contacts (e.g. gold-plated contacts).

4. Connection unit 472 for mains connection 190 ÷ 265 V
190-265V

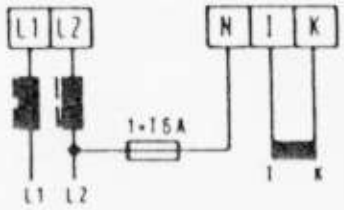


U_{mains}	190 - 265 V
U_A	160 V
I_A	16 A
P_{el}	2,5 KW

1x mains choke LK | 0,98 mH 35A
art.No. | 308 122

5. Special field voltages for 472, 473, 474 and 475

5.1 Field voltage > $0,9 \times U_{L1, N}$



U_{mains} L1, L2 = 340÷460 V
U_{input} L1, N = 340÷460 V
U_{field} I, K = $0,9 \times U_{L1, L2}$

Änderungen/ modification

6. Installation Instructions

Adequate ventilation of the unit must be ensured if installed in a housing. The ambient temperature must not exceed +45°C. Install the unit vertically with terminals pointing downwards.

Control cables must be shielded. One side of the shielding must be connected to the protective conductor on the unit.

The control electronics are not potential free in the "armature voltage control with I x R compensation" mode. Defective fuses must only be replaced by the prescribed type.

The feedback effect of the thyristor equipment on the supply mains is reduced by connecting mains chokes in series. It is only necessary to fit mains chokes if the inductance of the feed cable between mains and control unit is less than the values specified below.
Connect mechanical screw fixation of potentiometer with PE.
Allocation of mains chokes:

Unit	471	472	473	474	475
Mains choke	2,5 mH 18 A	0,98 mH 35 A	0,84 mH 35 A	0,61 mH 45 A	0,44 mH 65 A
Art.No.	308121	308122	308123	308124	308125
Number per unit	1x	2x	2x	2x	2x

7. Adjustment Instructions

Trimmer n_{min}, n_{max}, Vp, IxR to left-hand stop. Trimmers $U_{Leit\ grob}$ and $U_{Leit\ fein}$ are adjusted at the works for the standard set value potentiometer connection. Only when operating with a master voltage is it necessary to take $U_{Leit\ grob}$ to the left-hand stop and $U_{Leit\ fein}$ to the centre position in order finally to be able to make the basic adjustment.
Trimmer I_{max} is set to the nominal current of the unit at the works.

7.2 Setting the current limit (only necessary if the nominal motor current is smaller than the nominal current of the unit)

Connect a moving coil instrument for measuring the current into the armature cable. Lock armature or disconnect field. Switch on mains and turn trimmer n_{min} to right-hand stop. Turn trimmer I_{max} in order to adjust the armature current. Finally place trimmer n_{min} at left-hand stop.

7.3.1 Armature voltage control with IxR compensation

Connect terminal A of the motor to terminal 1 of the controller and terminal B of the motor to terminal 2 of the controller as shown on the connection diagram. Set value potentiometer or master voltage to be at zero. Switch on mains. LED "RSP" lights up. LED "$\pm V_{cc}$" lights up. Adjust set value potentiometer or the master voltage to maximum. In the case of the master voltage mode turn trimmer $U_{Leit\ grob}$ in a clockwise direction until there is +10 V at measuring point M1. Close switch "RFR". LED "RSP" goes out. Turn trimmer n_{max} in a clockwise direction until the required upper speed is reached. Adjust set value potentiometer or master voltage to zero. Rotating trimmer n_{min} in a clockwise direction increases the lower speed. Check the upper speed setting as trimmers n_{max} and n_{min} influence each other.

Trimmer $U_{Leit\ fein}$ is used for fine adjustment of the upper speed. Turn trimmer Vp in a clockwise direction until the drive becomes unstable (speed oscillation), then turn back trimmer Vp approximately 20% until the drive operates in a stable manner. The speed stabilizer is adjusted at trimmer IxR so that there is the smallest speed change between no load and nominal load at the lowest operating speed. Finally, check the compensation at higher speeds.

7.3.2 Speed control with tacho feedback

Set value potentiometer or master voltage at zero. Switch on mains. LED "RSP" lights up. LED "$\pm V_{cc}$" lights up. Adjust set value potentiometer or master voltage to maximum. In the case of the master voltage mode, turn trimmer $U_{Leit\ grob}$ in a clockwise direction until there is +10 V at measuring point M1. Close switch "RFR". LED "RSP" goes out. Turn trimmer n_{max} clockwise until the required upper speed is reached. Adjust set value potentiometer or master voltage to zero. Rotating trimmer n_{min} in a clockwise direction increases the lower speed. Check the upper speed setting as trimmers n_{max} and n_{min} influence each other.

Trimmer $U_{Leit\ fein}$ is used for fine adjustment of the upper speed. Turn trimmer Vp in a clockwise direction until the drive becomes unstable (speed oscillation), then turn back trimmer Vp approximately 5% until the drive operates in a stable manner.

8. Switching mode

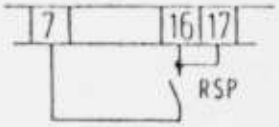
8.1 Regulator release

The regulator is released when switch "RFR" is closed. No firing pulses are supplied when the "regulator release" switch is open.

Use low current contact (15V/1.5 mA)

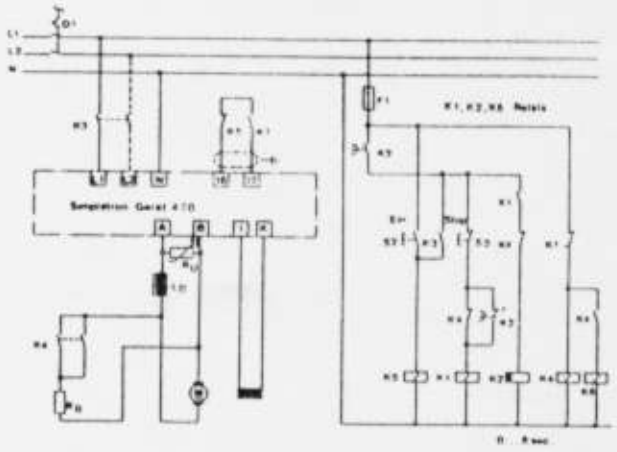
8.2 Impulse inhibit

The "RSP" function (locking the regulator by means of a make-contact), as previously used with the Simplatron regulators, still exists. No ignition impulses are supplied when the "impulse inhibit" switch is closed.



Use weak current contact (15V/1.5 mA)

8.3 Electro-dynamic braking



Brake Circuit

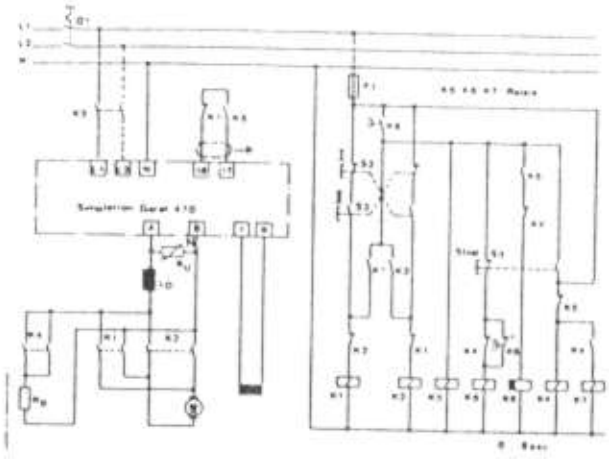
In order to brake the running motor, the induced armature current is used for braking with the field excited. The impulse inhibit is operated before the brake resistor is connected. Adjust the time relay so that the brake contactor is not de-energised until the motor is stationary. A zinc-oxide varistor is to be connected in parallel with the regulator in order to restrict voltage peaks.

Sizing of brake resistor R_B: see "small collection of formulae"

Allocation of zinc-oxide varistor R1:

Unit	Varistor type	Article No.	Make
471	B32 **K275**	308 935	Siemens
472-475	B32 K460		Siemens

8.4 Reversing



Reversing Circuit

The direction of rotation is reversed by reversing the armature poles. The motor is braked electro-dynamically until it is stationary. The braking time is to be set at the time relay so that the motor is brought reliably to a stop after reversing the armature poles. A zinc-oxide varistor is to be connected in parallel with the regulator in order to restrict voltage peaks.
Sizing of brake resistor R_B: see "small collection of formulae"

9. Additional terminals

[12] Current regulator input; $R_i \approx$ 10kOhm; U_{isoll} = 0... -10V

[14] $-V_{cc}$ = -15 V stabilised. $-V_{cc}$ can be externally loaded with 7.5 mA.

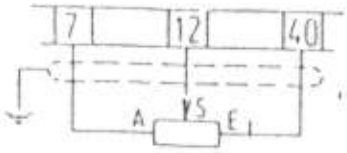
[31] Armature current actual value output. Terminal 31 output supplies an output voltage proportional to the armature current. $U_{31} \approx$ 10V corresponds to the nominal current of the unit. This output can carry a maximum of 3 mA.

[38] Freely wired speed regulator input.
Terminal 38 leads to the summation point of the speed regulator via Ri = 50 kOhm. The permitted input voltage range is between -10V and +10V.

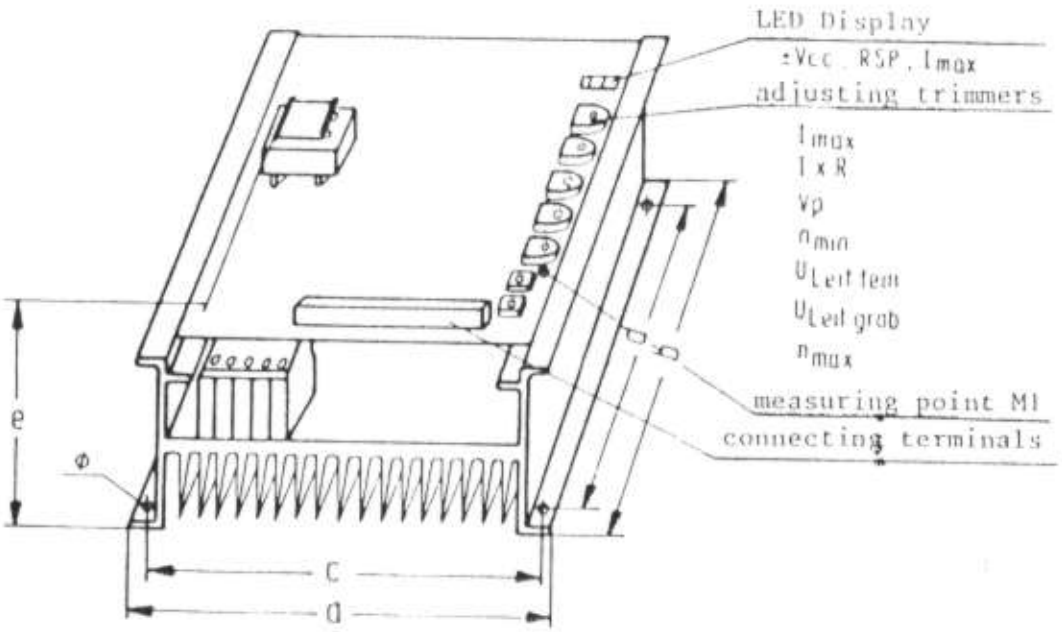
[40] Speed regulator output; Ri ≈ 200 Ohm. Terminals 40 and 12 are interconnected internally via a 2.2 kOhm resistor (on soldered support points).

2.2 kOhm resistor reference	R818	R207	R406
Unit	471	472	473-475

This resistor is to be removed when an external set value potentiometer is connected.



10. Dimensions



Type	a	b	c	d	e	Φ
471	150	220	135	210	70	4,8
472	150	220	140	210	135	4,8
473	240	160	224	140	145	7
474	240	220	224	200	145	7
475	240	330	224	310	145	7

11. Scope of Supply

Units 471 and 472 with built-in mains and electronic fuses.
Units 473 - 475 with built-in electronic fuses.
10 kOhm set value potentiometer.
The following have to be ordered separately:
Mains chokes, armature chokes, knob and scale for set value potentiometer and mains fuses and fuse holders for units 473 ÷ 475.