

VENTILATORS CONTROL AND AUTOMATICS

A decorative graphic consisting of a series of overlapping squares and diamonds, arranged in a pattern that tapers from left to right. The shapes are light gray and are set against a dark gray background that forms a horizontal band across the middle of the page.

1. POWER SUPPLY/CONTROL BOX

Power supply and control is designed to supply and control operation of single speed, double speed and explosion-proof fans.

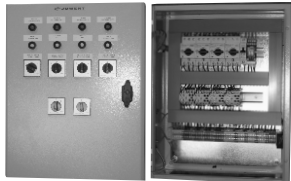
The box incorporates:

- main switch
- overcurrent breakers
- contactors and relays
- signal lamps (operation, alarm).

All switchgear components manufactured by leading suppliers of electrical equipment provide the highest reliability. They are incorporated in the box enclosures equipped with a front cover. The actuating levers, adjustment knobs and signalling elements are adjusted from the outside. Internal connections are completely covered and protected to guarantee safe maintenance and normal operation. Other benefits of the Power Supply/Control Box include: large space to accommodate cable and terminals, high safety level, easy operation, servicing and maintenance and operator-friendly design. The size of the box depends on the number of connected fans; up to four devices can be connected to a single box.

Fig. 1 ZS control boxes dimensions

Box type	ZS-1/1	ZS-2/1 ZS-1/2	ZS-3/1 ZS-2/2	ZS-4/1 ZS-3/2	ZS-4/2
Height [mm]	240	280	400	500	500
Width [mm]	160	200	300	400	500
Depth [mm]	125	125	150	200	200



For special requirements, the Power Supply/Control Box can be adapted to accommodate other controls and actuating components and to control parameters, in particular, temperature, humidity and timer (controls the operation of fans in user-defined time intervals). Electrical connections should be made according to the enclosed start-up and regulation instruction. The box should be supplied from the main switchgear equipped with the main switch breaker and differential protection.

ZS... [-1;-2;-3;-4]/1 Power Supply/Control Boxes are designed to control 230VAC single phase and three-phase (single gear) fans [fig. 1]; ZS...[-1; -2; -3; -4]/2 are designed to control 3x400 VAC three-phase (3~400V, two-gear) fans. For matching the control box with the fan, see tables 1-6.

DESIGNATIONS

Power Supply/Control Box

ZS - 1 | 1

Number of connected fans 1,2,3,4

Fan type 1 - single- or three-phase single-gear fan
2 - three-phase two-speed fan

2. REVOLUTIONS CONTROLLERS

2.1. Transformer speed controllers

ARW-...[-1,2; -3; -5] (1~230V/50Hz) five-speed transformer speed controllers or RTRD [-2;-4;-7] (3~400V/50Hz) fans are intended for air flow control. Fan speeds are selected manually. The box should be supplied from main switchgear equipped with main switch breaker, differential protection as well as thermal and short circuit protection. Three sizes of the controller are available, differing in terms of power supply and rated current.

Fig. 1 ARW speed controller
(Electrical diagram, see fig. 12)

Controller type	ARW-1,2	ARW-3	ARW-5
Voltage [V]	230	230	230
IP	21	21	21
Dimensions [mm]	123x77x71	173x90x89	280x200x160





Fig. 2 RTRD speed controller
(Electrical diagram, see fig. 13)

Controller type	RTRD-2	RTRD-4	RTRD-7
Voltage [V]	400	400	400
IP	21	21	21
Dimensions [mm]	255X190X135	309X162X160	309X162X160




To avoid damage to the controller, only one device should be connected.
The controllers do not incorporate short-circuit protection.
For matching the controller, see tables 1 - 6.

2.2. TR Speed Controller

TR Speed Controller is used for stepless speed control of single-phase WD-16-J, WD-20-J, WD-25-J, WD-31,5-J roof fans.

Fig. 3 RTRD speed controller
(Electrical diagram, see fig. 14)

Supply voltage	230V
Regulated load voltage	90...230V
Continuous load current	5 A
Load power	500 W
Slow blow fuse	5 A
Power switch	2-gear





2.3. Inverter F

By stepless or multi-step speed control of the three-phase fans, the frequency inverter adjusts the air flow to match the building requirements. Other benefits of the inverter include energy efficiency, motor against overload protection and lower noise level. The fan speed control may be controlled using the following inverters:

- F Inverter intended for retrofitting in the existing or designed control panel in compliance with the inverter operation specifications;
- FZS Inverter incorporating power supply protection and on/off switch in the built-up control cabinet.

For matching the inverters, see tables 1 - 6.

Voltage	Three phase 400V/50Hz									
Motor power [kW]	0,37	0,75	1,5	2,2	3	4	5,5	7,5	11	
Inverter type	F037	F075	F1K5	F2K2	F3K0	F4K0	F5K5	F7K5	F11K0	
Current [A]	1,6	3	4,8	6,4	8,3	10,6	14,2	18,1	27	
Protection level	IP 20									

3. TP AND TPP INDOOR THERMOSTAT

With the on-off TP Indoor Thermostat, the room temperature may be adjusted with the adjustment knob within the range from 8°C up to 30°C, and the on-off TPP Indoor Thermostat with LCD display enables setting of the room temperature within range 8°C - 35°C in a day/night mode. Operation mode fan on/off is set at the installation. TP and TPP thermostats are designed for wall installation.

Fig. 5 TP indoor thermostat
(Electrical diagram, see fig. 15)



Supply voltage	24...250 V	
Measurement range	8...30°C	
Contact load	6(2) A	
Protection level	IP 30 or IP 65	


Fig. 6 TPP indoor thermostat
(Electrical diagram, see fig. 16)

Supply voltage	2 baterie 1,5v	
Measurement range	5...30 ^A	
Contact load	5(2) A	
Protection level	IP 30	

4. TW Humidistat (ON-OFF)

TW Humidistat allows monitoring and controlling relative humidity levels in the room against the level pre-settable within 30% - 70%.

Fig. 7 TW Humidistat
(Electrical diagram, see fig. 17)

Supply voltage	24...250V	
Measurement range	30...100%	
Contact load	5(2) A	
Protection level	IP 30	

5. TZ AIR POLLUTION THERMOSTAT


TZ Air Pollution Thermostat is used in air ventilation systems for the removal of odorants and gases from air, including cigarette smoke, sweat, kitchen odours, carbon monoxide, methane, ethane, acetone, methanol, etc. TZ Air Pollution Thermostat is recommended for use in rooms with a variable concentration of people and/or odorant as it optimises the time required to exchange the air in the room and maintains the air quality.

Typically, such applications include:

- small restaurants, pubs, bistros
- lounges, waiting rooms
- recreation rooms and smoking rooms
- kitchens
- changing rooms, wardrobes, cloakrooms
- ventilation control in residential facilities

The measured concentration is compared with the preset value. If the preset value has been exceeded, the fan will be switched on. Once the air quality in the room is restored, e.g. by airing or other measures, the thermostat switches off the fan terminating the airing. Note. TZ Air Pollution Thermostat should not be used for safety-related measurements.

Fig. 8 TZ air pollution thermostat
(Electrical diagram, see fig. 18)

Supply voltage	230V	
Contact load	8(6) A	
Protection level	IP 30	

6. DTW CARBON MONOXIDE DETECTOR

Microprocessor controlled DTW Carbon Monoxide Detector is intended for continuous monitoring of carbon monoxide concentration in rooms potentially exposed to carbon monoxide emissions. The detector periodically measures the concentration of carbon monoxide in the surrounding air. If the precisely defined threshold values are exceeded, a visual alarm is activated and ventilation control output is enabled.


Applications:

- garages and underground parking lots
- production shop floors exposed to carbon monoxide emission during technological processes
- boiler rooms fired with solid, liquid and gaseous fuels

Unique features:

- monolithic construction: gas sensor, power supply and control circuits in single enclosure;
- two independent alarm thresholds factory- or custom calibrated.

Fig. 9 DTW carbon monoxide detector
(Electrical diagram, see fig. 19)

Supply voltage	230V	
Power consumption	5 [W] max	
Operating temperature	-10...+45 °A	
Relative air humidity	30...90%	
Alarm thresholds	ALARM1 -50 ppm, ALARM2 -200 ppm	
Visual signalisation	ALARM1, ALARM2-red; AWARIA - yellow;	
Protection level	IP30	
Dimensions	165 x 130 x 90 mm	


7. ZG PROGRAMMABLE TIMER

ZG Timer is intended for switching the fan on and off in one of the 4 following modes:

- continuous manual mode - on
- continuous manual mode - off
- timer mode
- automatic programmed mode

The operation mode is adapted to individual customer needs


Fig. 10 ZG timer

Supply voltage	230V	
Memory capacity	8 programs per day	
Contact load	6(3) A	
Protection level	IP 20	

8. WS SERVICE SWITCH

WS service switch is used to switch the fan motor off for the period of servicing and maintenance. The WS service switch is a safety element that prevents the fan motor from accidental switch-on during in the course of servicing and maintenance

Fig. 11 WS service switch
(Electrical diagram, see fig. 20A and 20B)

Switch type	WS-3	WS-6	
Poles	3-poles	6-poles	
Supply voltage circuit switch	single and three phase	three phase	
Rated continuous current	25A	25A	
Protection level	IP 65	IP 65	

9. AUTOMATIC CONTROL COMPONENTS MATCHING TABLES

Table 1. Matching automatic control with WD-...-J, OWD-...-J and WDJ/WDJV-.... single phase fans

Fan type	WD-				OWD-							WDJ/WDJV-			
	-16	-20	-25	-31,5	-31	-35	-40	-45	-50	-56	-63	-17,5	-19	-22	-22,5
ZS-.../1 control box	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Transformer revolutions controller	—	—	—	—	ARW-1,2	ARW-1,2	ARW-3	ARW-3	ARW-3	ARW-5	—	ARW-1,2	ARW-1,2	ARW-1,2	ARW-1,2
Thyristor revolutions controller TR	●	●	●	●	—	—	—	—	—	—	—	—	—	—	—
Programmable timer ZG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Indoor thermostat TP/TPP	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Service Switch WS-3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- option
- not applicable

Table 2 Matching automatic control with WKO-... single phase fans

Fan type	WKO-					
	-10	-12,5	-16	-20	-25	-31,5
ZS-.../1 control box	●	●	●	●	●	●
Transformer revolutions controller	ARW-1,2	ARW-1,2	ARW-1,2	ARW-1,2	ARW-1,2	ARW-3
Programmable timer ZG	●	●	●	●	●	●
Termostat TP/TPP	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●
Service Switch WS-3	●	●	●	●	●	●

Table 3 Matching automatic control with WDV-...-J, WDVO-...-J i WKp-...-J single phase fans

Fan type	WDV/WDVO-							WKp-			
	-22	-25	-28	-31	-35	-40	-45	-1	-2	-3	-4
ZS-.../1 control box	●	●	●	●	●	●	●	●	●	●	●
Transformer revolutions controller	ARW-1,2	ARW-3	ARW-3	ARW-1,2	ARW-3	ARW-3	ARW-5	ARW-3	ARW-3	ARW-5	ARW-5
Thyristor revolutions controller TR	—	—	—	—	—	—	—	—	—	—	—
Programmable timer ZG	●	●	●	●	●	●	●	●	●	●	●
Termostat TP/TPP	●	●	●	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●	●	●	●
Service Switch WS-3	●	●	●	●	●	●	●	●	●	●	●

Table 4 Matching automatic control with WDVS-...-J, WDVOS-...-J single phase fans

Fan type	WDVS-...-J			WDVOS-...-J	
	-35	-45	-50	-31	-35
ZS-.../1 control box	●	●	●	●	●
Transformer revolutions controller	ARW-1,2	ARW-3	FA-11	ARW-3	ARW-3
Thyristor revolutions controller TR	—	—	—	—	—
Programmable timer ZG	●	●	●	●	●
Termostat TP/TPP	●	●	●	●	●
Humidistat TW	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●
Service Switch WS-3	●	●	●	●	●

- option
- not applicable

Table 5 Matching automatic control with WD-...-T, WD PLUS-...-T and WDEX-...-T three phase fans

Fan type	WD-					WD PLUS-			WDEX-				
	-16	-20	-25	-31,5	-40	-25	-31,5	-40	-16	-20	-25	-31,5	-40
ZS-.../1 control box	●	●	●	●	●	●	●	●	●	●	●	●	●
ZS-.../2 control box	●	●	●	●	—	—	—	—	—	—	—	—	—
F/FZS inverter	●	●	●	●	●	●	●	●	—	—	—	—	—
Indoor Thermostat TP/TPP	●	●	●	●	●	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●	●	●	●	●	●
Programmable timer ZG	●	●	●	●	●	●	●	●	●	●	●	●	●
Service Switch WS-6	●	●	●	●	●	●	●	●	●	●	●	●	●

Table 6 Matching automatic control with OWD-...-T three phase fans

Fan type	OWD-							
	-31	-35	-40	-45	-50	-56	-63	-71
ZS-.../1 control box	●	●	●	●	●	●	●	●
ZS-.../2 control box	●	●	●	●	●	●	●	●
Transformer revolutions controller	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-4	RTRD-4	RTRD-4
F/FZS inverter	●	●	●	●	●	●	●	●
Programmable timer ZG	●	●	●	●	●	●	●	●
Indoor Thermostat TP/TPP	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●
Service Switch WS-6	●	●	●	●	●	●	●	●

Table 7 Matching automatic control with WDV-...-T, WDVO-...-t three phase fans

Fan type	WDV/WDVO-									
	-22	-25	-28	-31	-35	-40	-45	-50	-56	-63
ZS-.../1 control box	●	●	●	●	●	●	●	●	●	●
ZS-.../2 control box	—	—	—	—	●	●	●	●	●	●
Transformer revolutions controller	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-2	RTRD-4	RTRD-4	RTRD-7
F/FZS inverter	●	●	●	●	●	●	●	●	●	●
Programmable timer ZG	●	●	●	●	●	●	●	●	●	●
Indoor Thermostat TP/TPP	●	●	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●	●	●
Service Switch WS-6	●	●	●	●	●	●	●	●	●	●

- option
- not applicable

Table 8 Matching automatic control with WDVS-...-TD and WDVOS-...-TD three phase two gear fans

Fan type	WDVS-...TD							WDVOS-...TD			
	-31	-35	-40	-45	-50	-56	-63	-31	-35	-40	-45
ZS-.../1 control box	●	●	●	●	●	●	●	●	●	●	●
ZS-.../2 control box	—	—	—	—	●	●	—	●	●	●	●
Transformer revolutions controller	RTRD-2	RTRD-2	RTRD-2	RTRD-4	RTRD-4	RTRD-4	RTRD-7	RTRD-2	RTRD-2	RTRD-2	RTRD-2
F/FZS inverter	●	●	●	●	●	●	●	●	●	●	●
Programmable timer ZG	●	●	●	●	●	●	●	●	●	●	●
Indoor Thermostat TP/TPP	●	●	●	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●	●	●	●
Service Switch WS-6	●	●	●	●	●	●	●	●	●	●	●

Table 9 Matching automatic control with WKp-...-T three phase fans

Fan type	WKp-							
	-1	-2	-3	-4	-5	-6	-7	-8
ZS-.../1 control box	●	●	●	●	●	●	●	●
ZS-.../2 control box	—	—	—	—	—	—	—	—
Transformer revolutions controller	RTRD-2	RTRD-2	RTRD-2	RTRD-4	RTRD-4	RTRD-7	RTRD-11	RTRD-4
F/FZS inverter	●	●	●	●	●	●	●	●
Programmable timer ZG	●	●	●	●	●	●	●	●
Indoor Thermostat TP/TPP	●	●	●	●	●	●	●	●
Humidistat TW	●	●	●	●	●	●	●	●
Air Pollution Thermostat TZ	●	●	●	●	●	●	●	●
Service Switch WS-6	●	●	●	●	●	●	●	●

- option
- not applicable

10. WIRING DIAGRAMS

Fig. 15 ARW revolutions controller

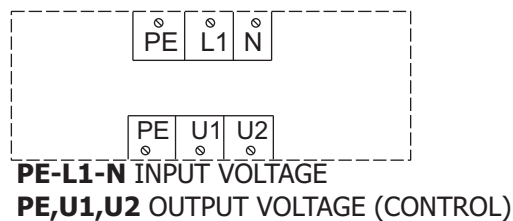


Fig. 16 revolutions controller

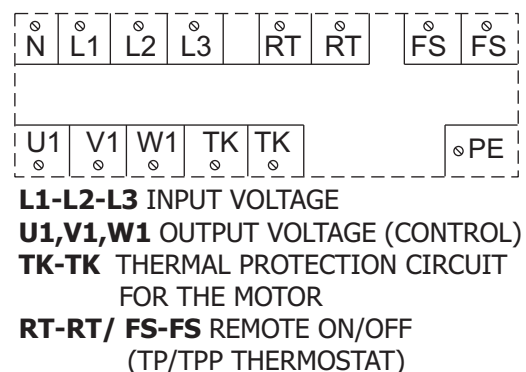


Fig. 17 TR revolutions controller

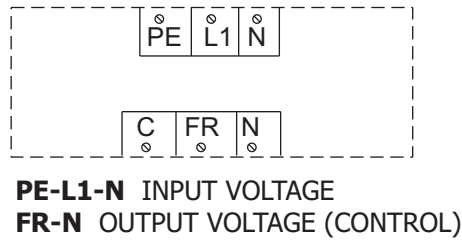


Fig. 18 TP thermostat

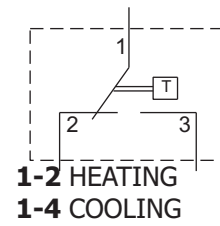


Fig. 19 TPP thermostat

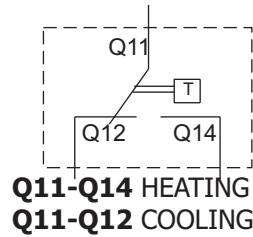


Fig. 20 TW Humidistat

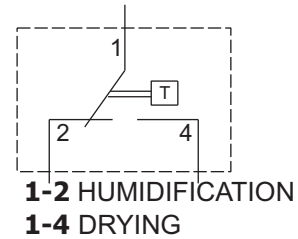


Fig. 18 TZ thermostat

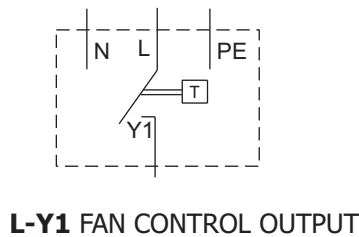


Fig. 19 DTW detector

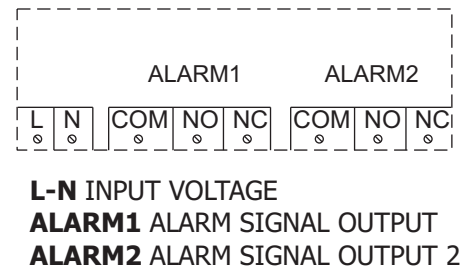


FIG. 20A WS service switch (3-poles)

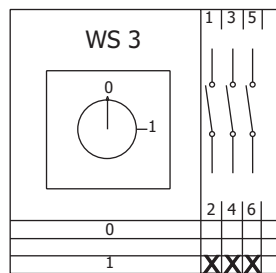
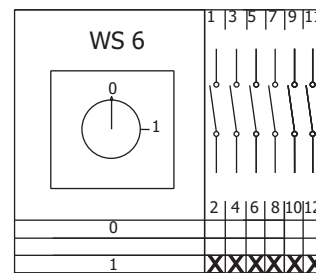
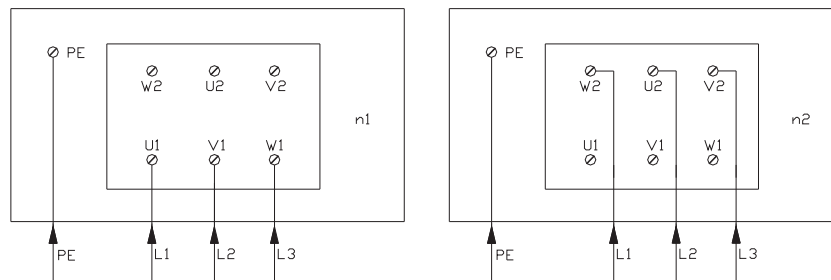


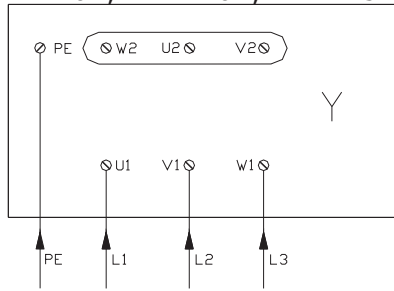
FIG. 20B WS service switch (6-poles)



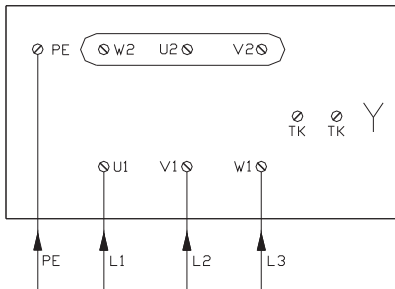
Motor connection diagram: (Y/Y; n1 < n2):
WD-16-TD, WD-20-TD, WD-25-TD, WD-31,5-TD



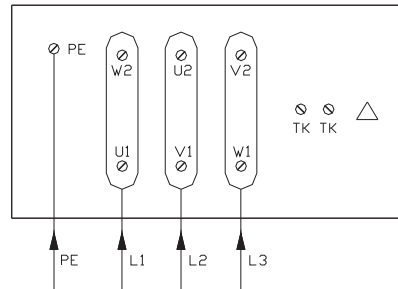
Motor connection diagram:
 WD-40-T, WD PLUS-25-T, WD PLUS-31,5-T, WD PLUS-40-T
 WDEx-16-T, WDEx-20-T, WDEx-20-T, WDEx-25-T, WDEx-40-T



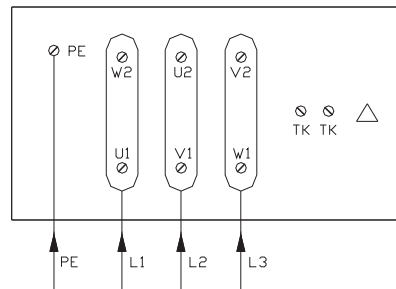
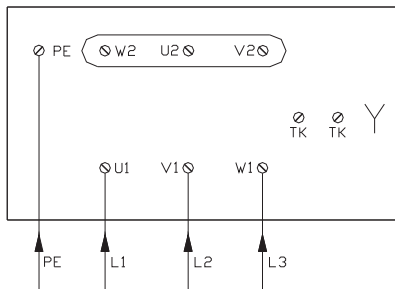
Motor connection diagram:
 WDV(O/S/OS)-22-T, WDV(O/S/OS)-25-T,
 WDV(O/S/OS)-28-T, WDV(O/S/OS)-31-T



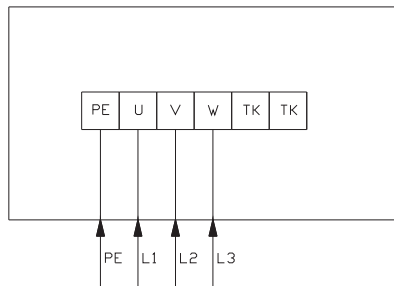
Motor connection diagram:
 OWD-63-T, OWD-74-T



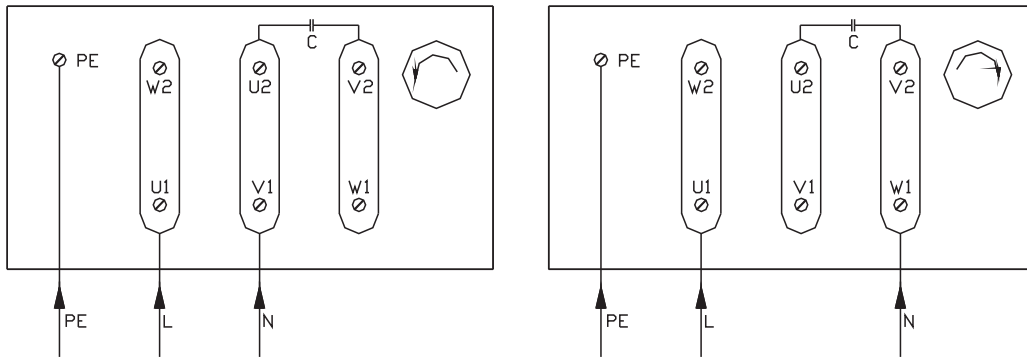
Motor connection diagram:
 OWD-31-T, OWD-35-T, OWD-40-T, OWD-45-T, OWD-50-T, OWD-56-T
 WDV(O/S/OS)-35-T, WDV(O/S/OS)-40-T, WDV(O/S/OS)-45-T,
 WDV(O/S/OS)-50-T, WDV(O/S/OS)-56-T, WDV(O/S/OS)-63-T



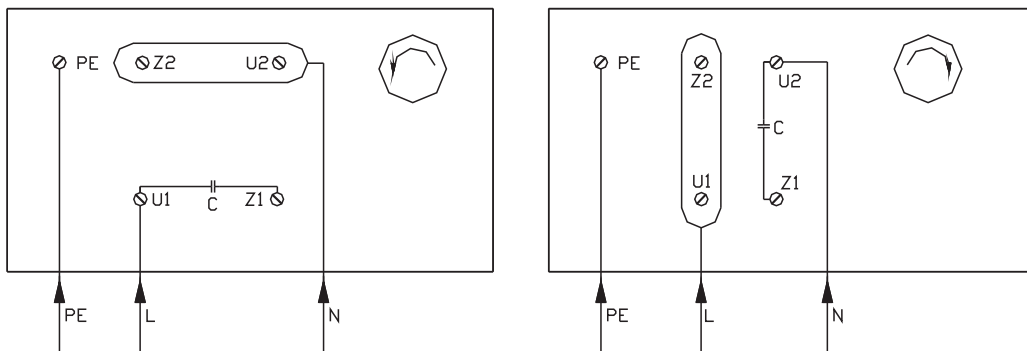
Motor connection diagram:
 WKP-1-T, WKP-2-T, WKP-3-T, WKP-4-T, WKP-5-T, WKP-6-T, WKP-7-T, WKP-8-T



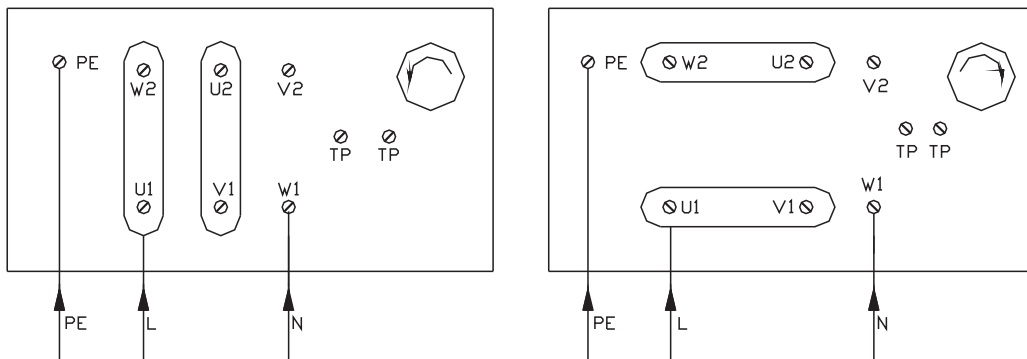
Motor connection diagram: WD-16-J, WD-20-J, WD-25-J



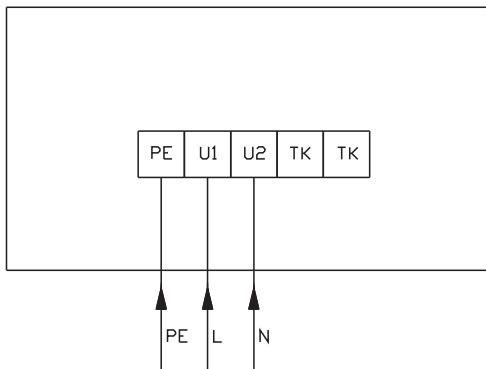
Motor connection diagram: WD-31,5-J



Motor connection diagram:
OWD-31-J, OWD-35-J, OWD-40-J, OWD-45-J, OWD-50-J, OWD-56-J, OWD-63-J



Motor connection diagram:
WDV(O)-22-J, WDV(O)-25-J, WDV(O)-28-J,
WDV(O)-31-J, WDV(O)-35-J, WDV-40(O)-J,
WDV(O)-45-J, WKP-1-J, WKP-2-J, WKP-3-J, WKP-4-J



Motor connection diagram:
WDJ(V)-17, WDJ(V)-19, WDJ(V)-22, WDJ(V)-22,5
WKO-10, WKO-12,5, WKO-16,
WKO-20, WKO-25, WKO-31,5

