BlackSTN®
Pump Control System

KRK
Electric Construction
Tourism Industry and
Trade Limited Co.

ELECTROMECHANIC BOARDS PRODUCT CATALOG

PMK / PMK-AS

CE

We manage water.
You can use it safely.

MADE IN TURKEY

PMK Series control panel; It has been specially designed to provide direct or star delta operation of pumps and protection of pumps in booster systems.
The control panel has automatic - manual operation selection. For manual operation, it is started with the start-stop buttons on the f ront panel. For automatic operation, the system activates and deactivates the pumps with the signal it receives from the pressure switch. With a specially designed multimeter on the panel, 3-phase voltage and 3-phase current are measured and displayed on the display screen.
measured values can be monitored. Protection is done by setting the upper and lower voltage/current values with a multimeter.
The system can recognize the pump with a single button and set the lower and upper current values

General Information

- *Microprocessor based design*
- *Auto Manual selection key.*
- *Manuel start-stop.*
- *6 x 9.2mm 3digit 7 segment displays.*
- *Ability to monitor pump operating hours on the screen.*
- *Being able to see the voltage values on the screen.*
- *Phase sequence error protection.*
- *Being able to set High Voltage and Low Voltage protection values.*
- *Seeing the pump current values on the screen.*
- *Ability to set high current and low current protection value*
- *Possibility to set error delay time.*
- *General Error / Waterless Operation signal warning leds*
- *Protection against waterless operation with float*
- *Additional low current protection against running without water.*
- *All fault conditions can be seen on the screen.*
- *Reporting fault conditions with relay contact.*
- *Separate digital thermal protection for each pump in multiple pumps.*
- *Co-aging feature in multiple pumps (optional).*
- *1 programmable dry contact output.*
- *Adjust the star-delta transition time*

CONNECTION DIAGRAM

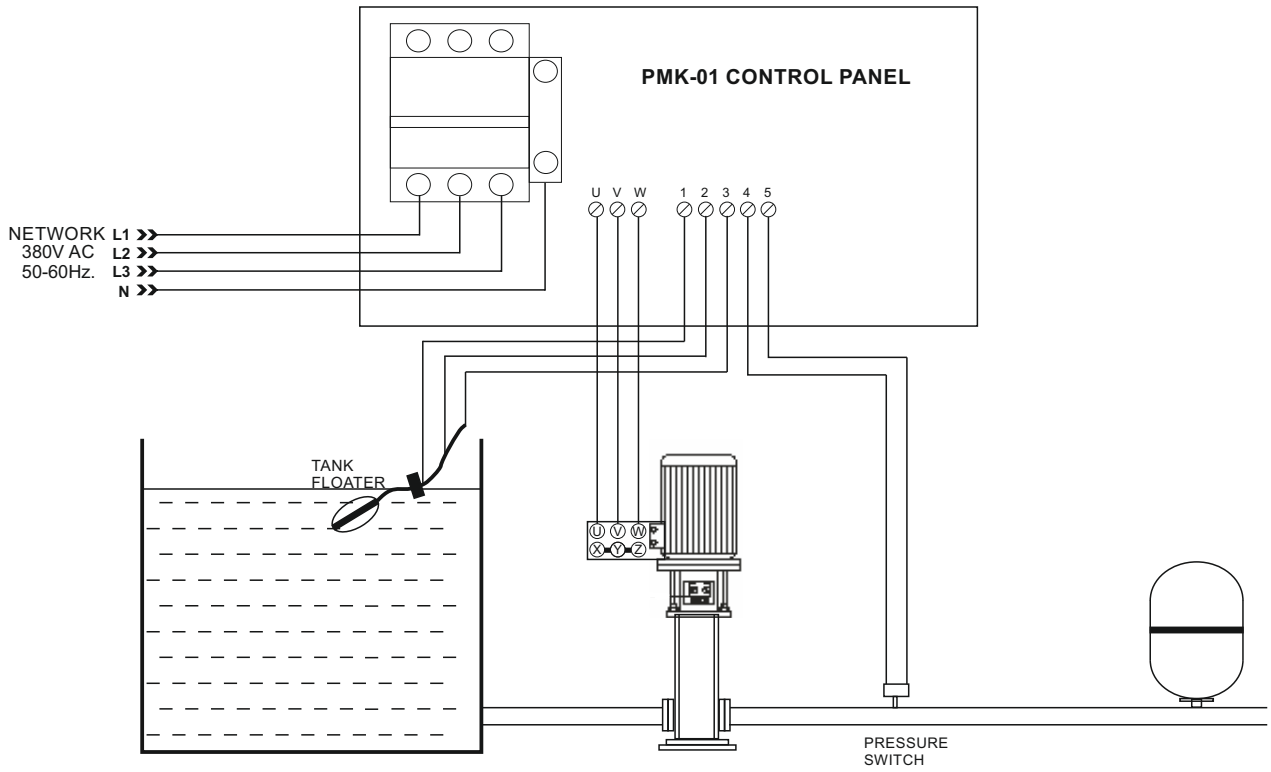

Figure 1: PMK-01 Panel Direct Start Connection Diagram

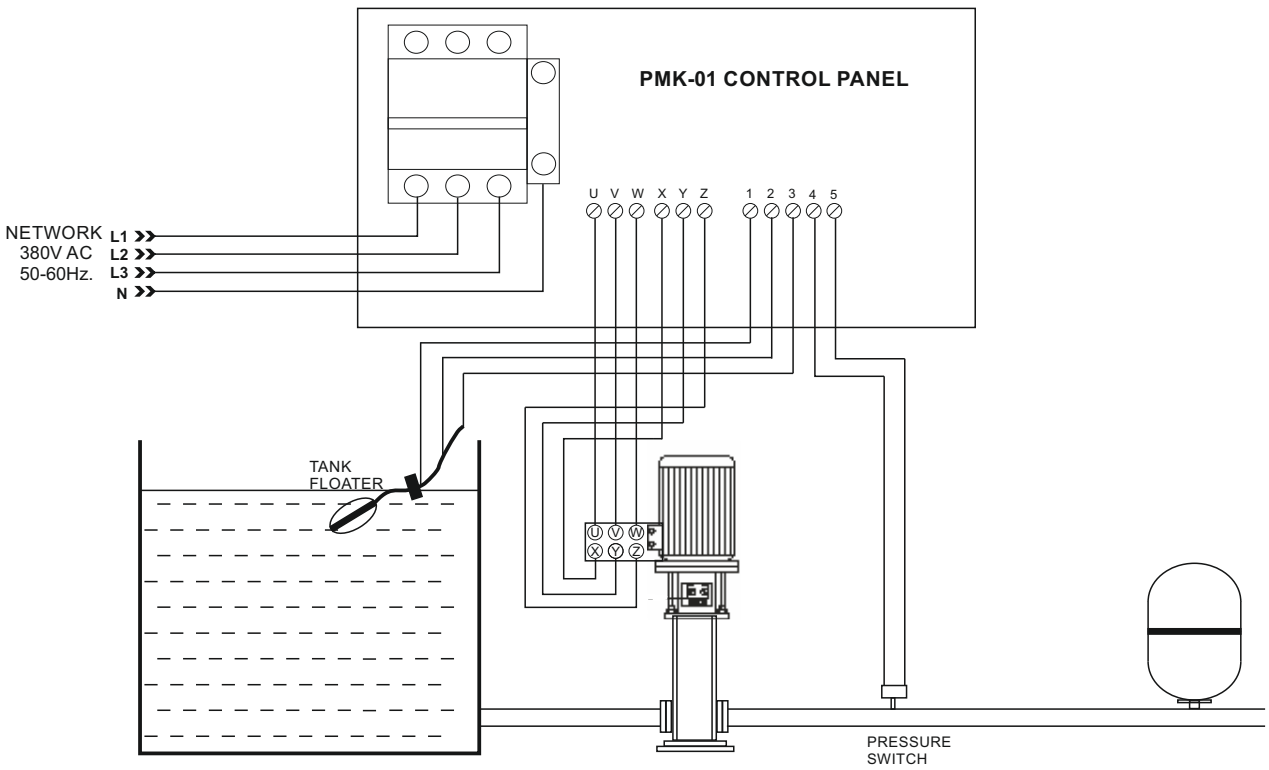

Figure 2: PMK-01 Panel Star Delta Start Connection Diagram

CONNECTION DIAGRAM

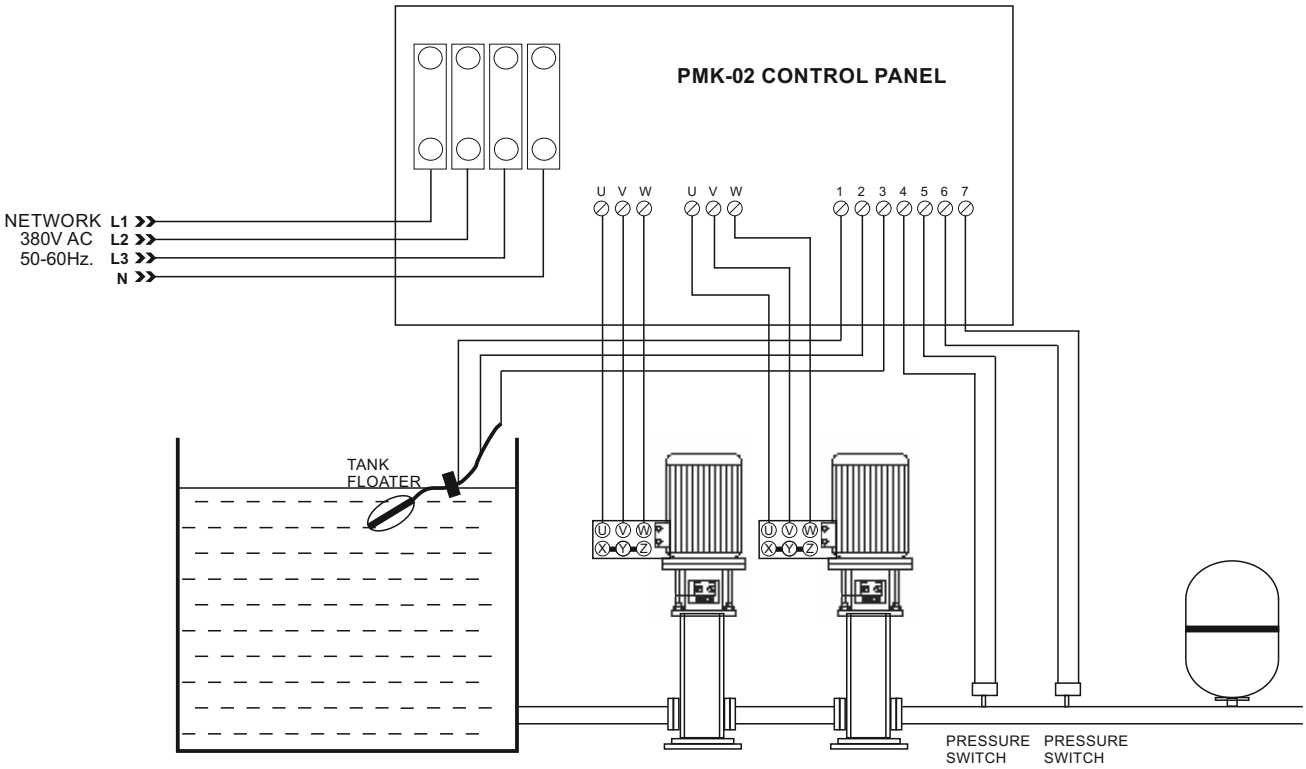

Figure 3: PMK-02 Panel Direct Start Connection Diagram

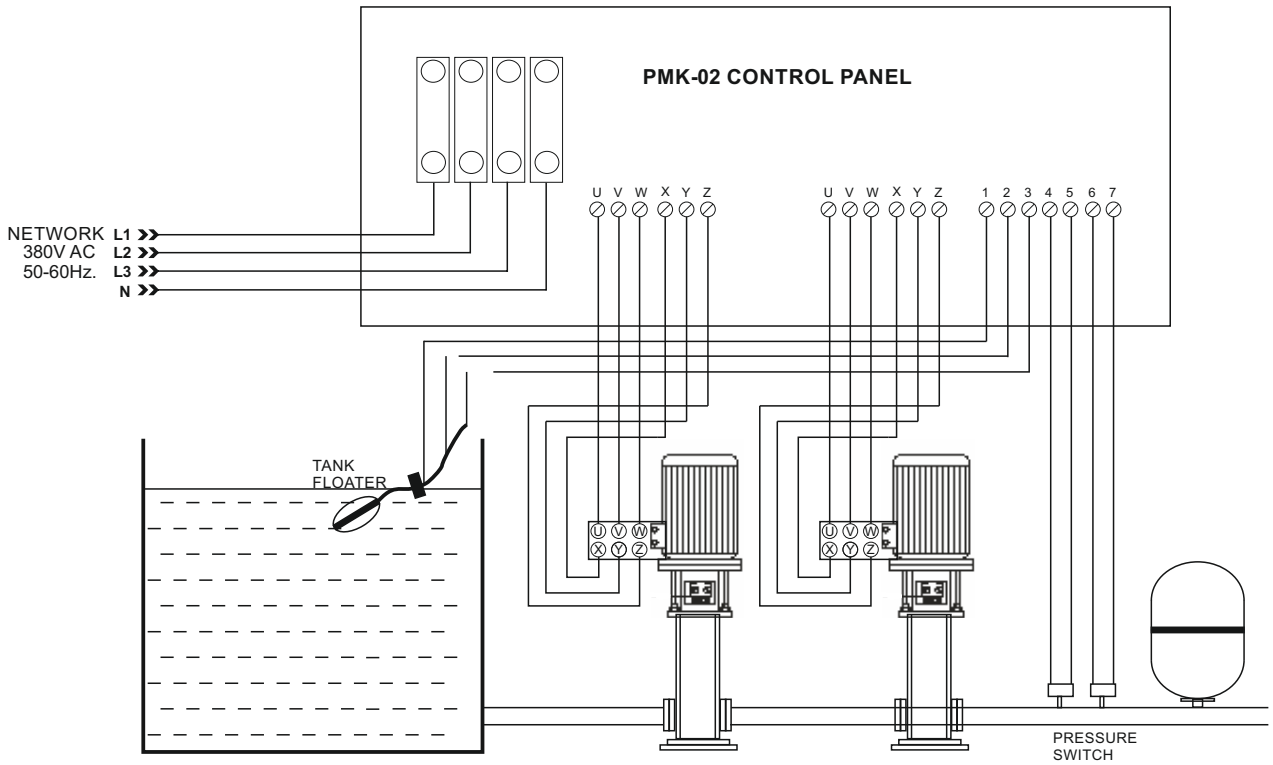

Figure 4: PMK-02 Panel Star Delta Start Connection Diagram

CONNECTION DIAGRAM

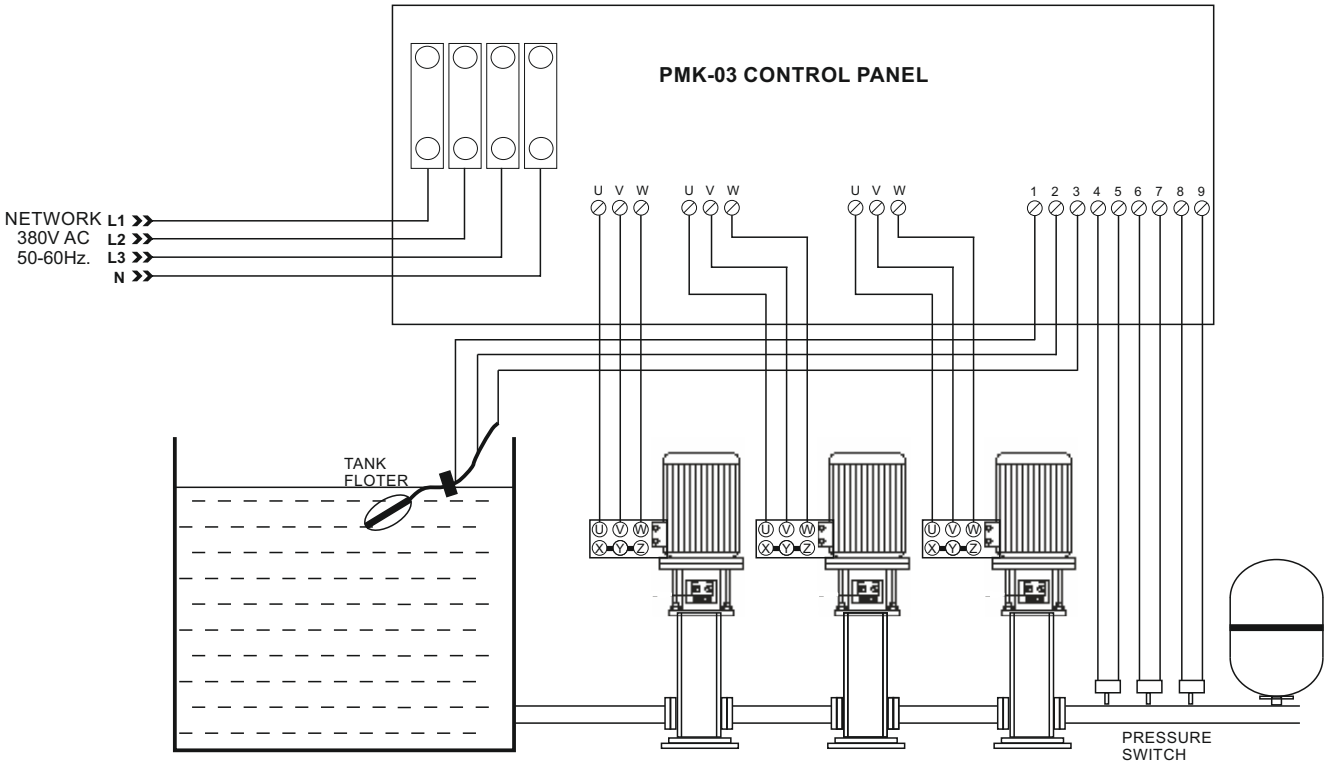

Figure 6: PMK-03 Panel Direct Start Connection Diagram

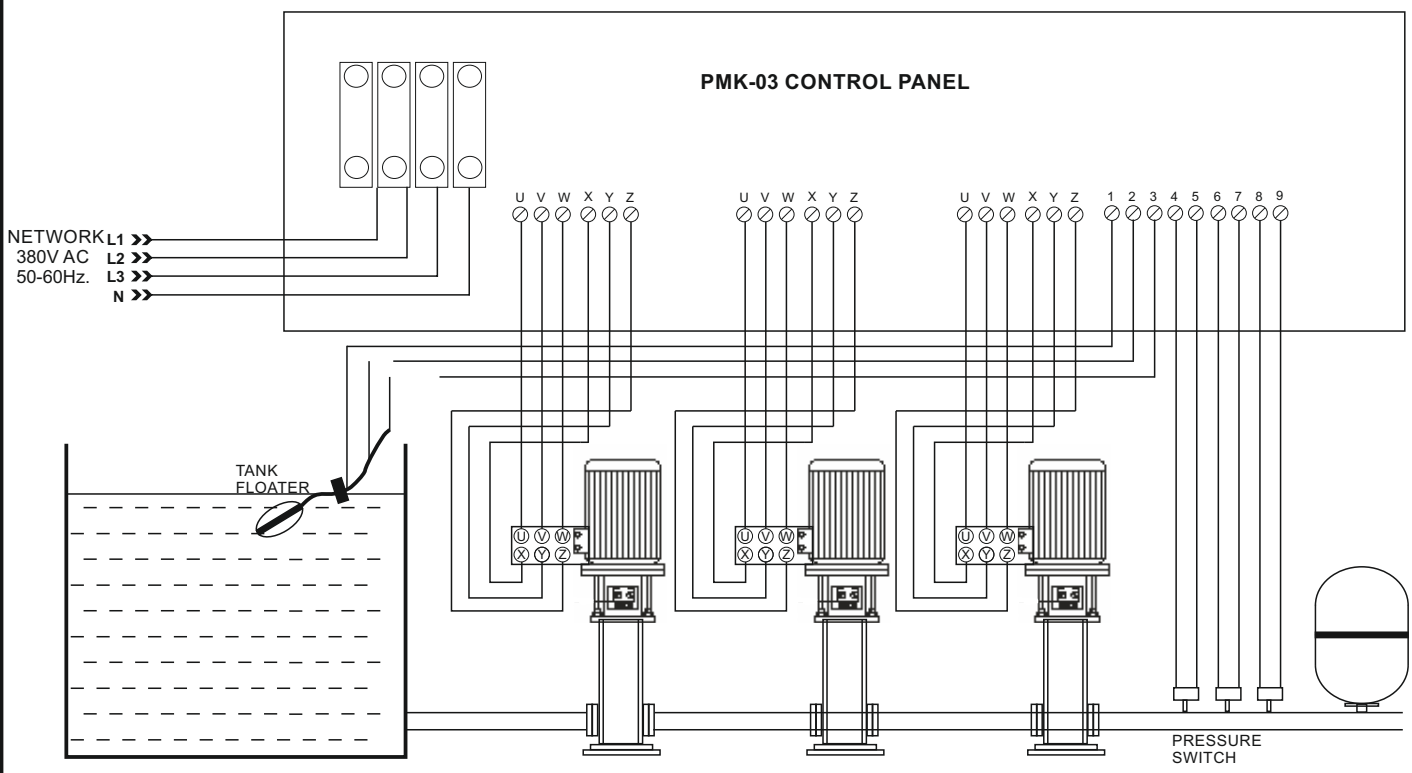

Figure 7: PMK-03 Panel Star Delta Start Connection Diagram

Technical Drawings

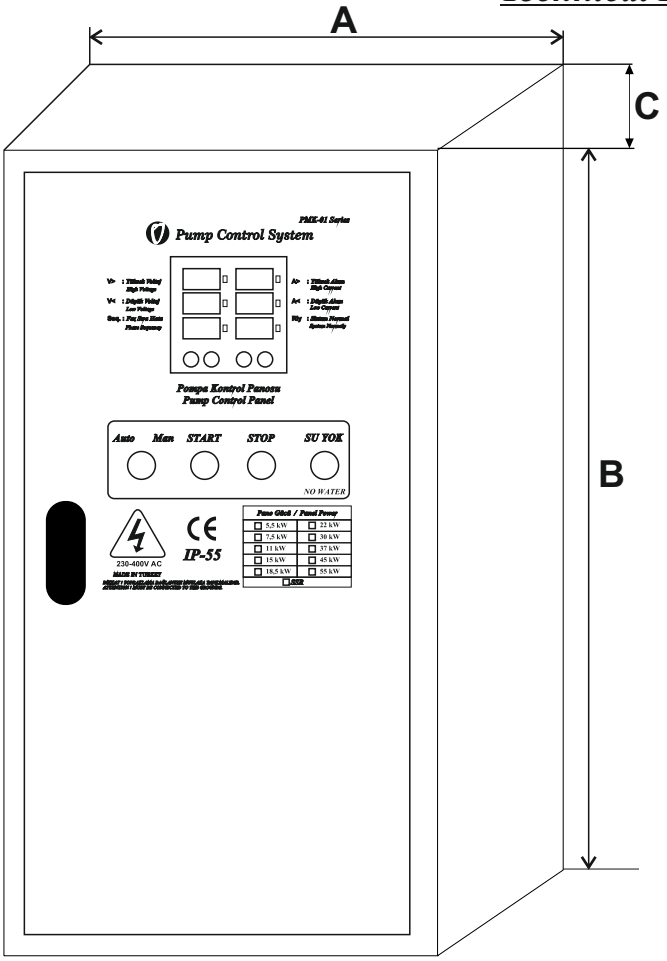

Figure 8: PMK-01 Panel Outer View

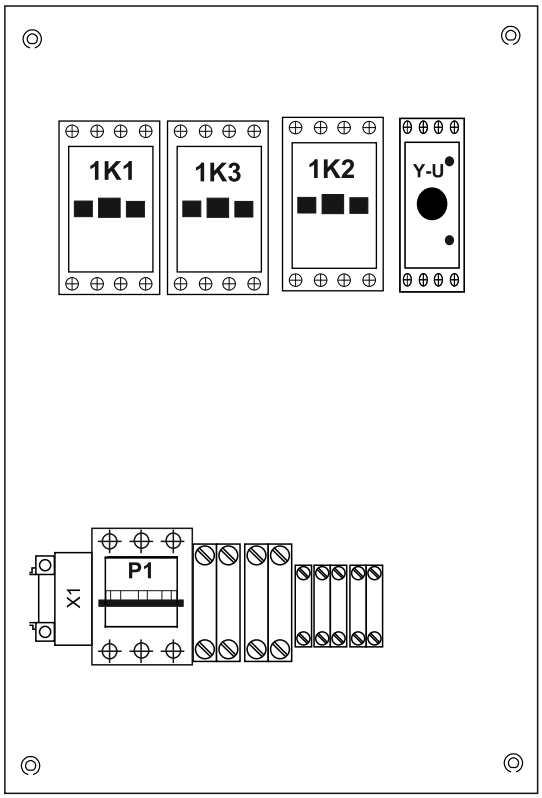

Figure 9: PMK-01 Panel Internal View

PMK-01 Panel Dimensions

POWER	A	B	C
7,5kW	300mm	400mm	200mm
11kW	400mm	500mm	200mm
15kW	400mm	500mm	200mm
18kW	400mm	500mm	200mm
22kW	400mm	500mm	200mm
30kW	400mm	600mm	200mm
37kW	400mm	600mm	200mm
45kW	500mm	700mm	260mm
55kW	500mm	700mm	260mm
75kW	500mm	700mm	260mm
90kW	700mm	1000mm	320mm
110kW	700mm	1000mm	320mm

Technical Drawings

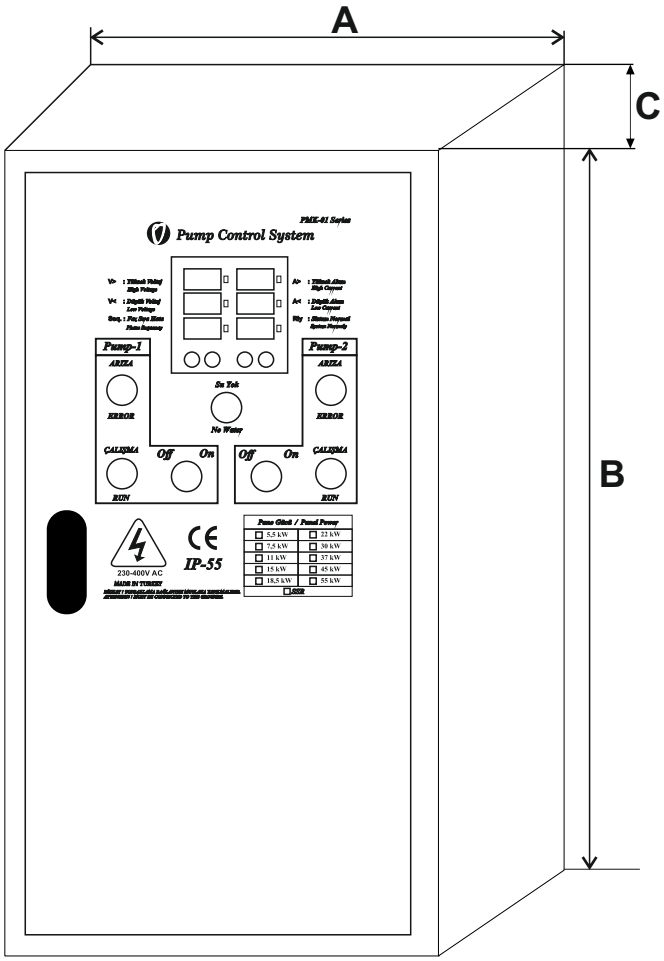

Figure 10: PMK-02 Panel Outer View

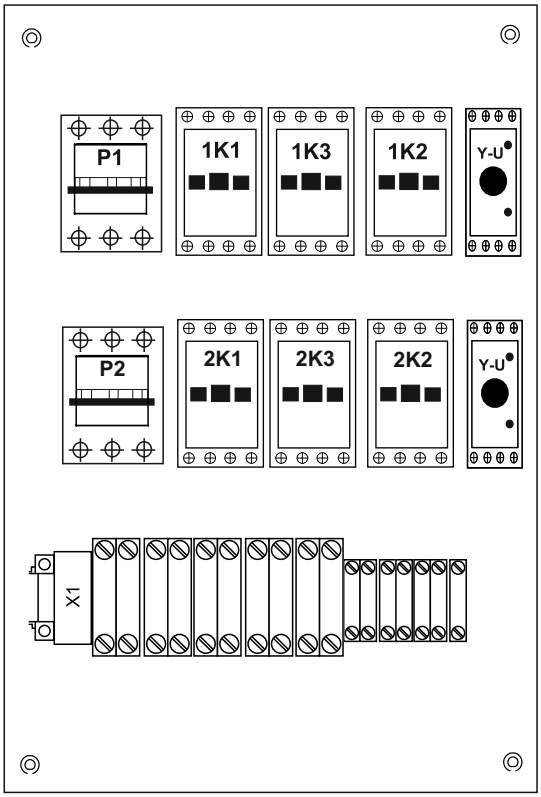

Figure 11: PMK-02 Panel Internal View

PMK-02 Panel Dimensions

POWER	A	B	C
5,5kW	300mm	400mm	200mm
7,5kW	400mm	500mm	200mm
11kW	400mm	600mm	200mm
15kW	400mm	600mm	200mm
18kW	400mm	600mm	200mm
22kW	400mm	600mm	200mm
30kW	700mm	1000mm	320mm
37kW	700mm	1000mm	320mm
45kW	700mm	1000mm	320mm
55kW	700mm	1000mm	320mm
75kW	700mm	1000mm	320mm
90kW	1000mm	1300mm	380mm

Technical Drawings

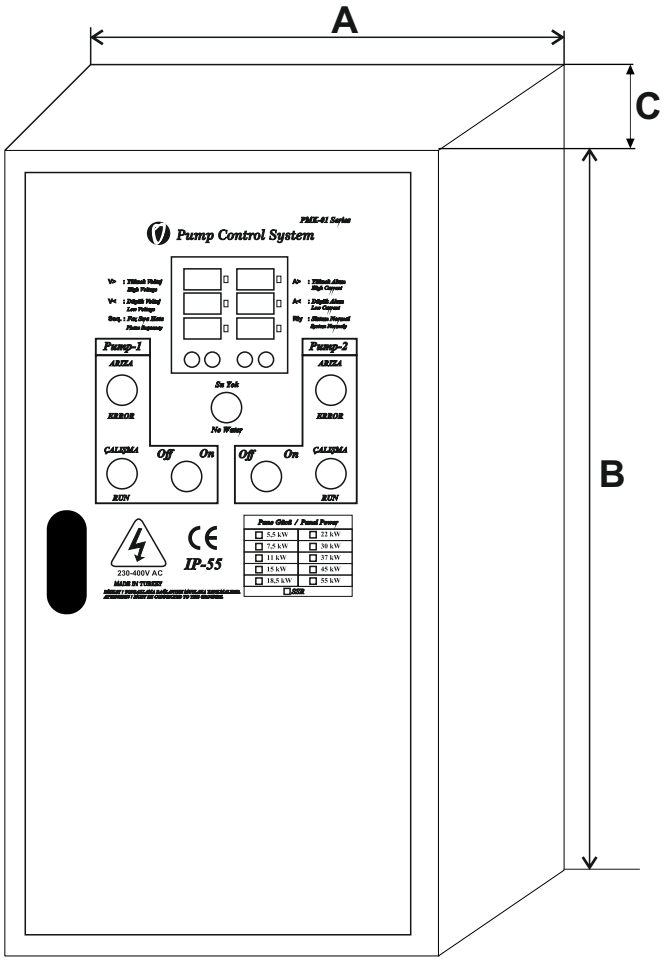

Figure 12: PMK-03 Panel Outer View

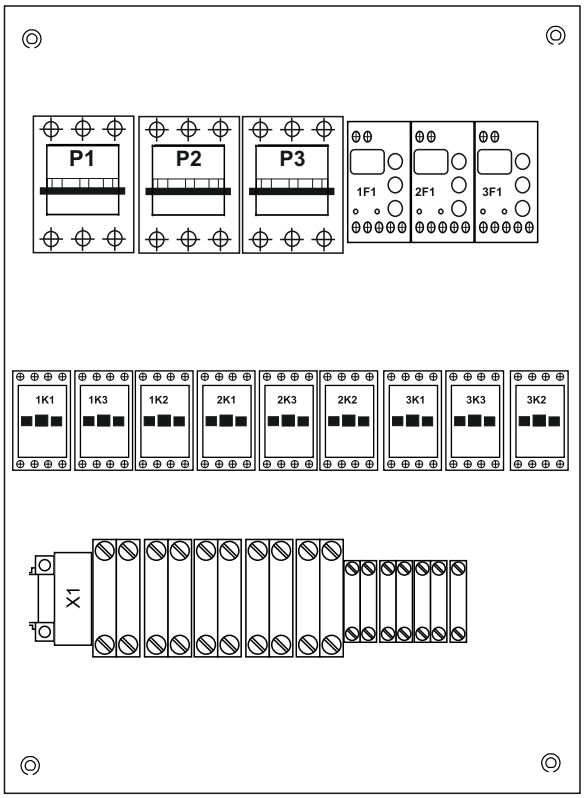

Figure 13: PMK-03Panel Internal View

PMK-03 Panel Dimensions

POWER	A	B	C
5,5kW	400mm	500mm	200mm
7,5kW	500mm	700mm	260mm
11kW	500mm	700mm	260mm
15kW	500mm	700mm	260mm
18kW	500mm	700mm	260mm
22kW	500mm	700mm	260mm
30kW	700mm	1000mm	320mm
37kW	700mm	1000mm	320mm
45kW	1000mm	1300mm	380mm
55kW	1000mm	1300mm	380mm
75kW	1000mm	1300mm	380mm

Technical details

Operating Voltage (Un)	230V – 380VAC
Operating Frequency	50/60Hz.
Working Power	<6VA
Operating Temperature	-20ºC to 55ºC
Voltage Measurement Range	10-500V AC
Measurement Accuracy	%±1
DelayTime setting	1-30 sec.
Indicator	5X3digit 9.2mm display and leds
Connection style	Terminal connection
Ignition	5A/250VAC Resistive Load
Connection Insulation	2.5kV
Assembly	On the pump or on the wall
Protection Class	Ip55
Working Altitude	<2000meter

PMK-AS Series control panel; It is specially designed for direct or star-delta operation of pumps in Waste Water systems and to protect the pumps.
The control panel has automatic - manual operation selection. For manual operation, it is started with the start-stop buttons on the front panel. For automatic operation, the system activates and deactivates the pumps with the signal it receives from the pressure switch. With a specially designed multimeter on the panel, 3-phase voltage and 3-phase current are measured and displayed on the display screen.
measured values can be monitored. Protection is done by setting the upper and lower voltage/current values with a multimeter.
The system can recognize the pump with a single button and set the lower and upper current values

General Information

- *Microprocessor based design*
- *Auto Manual selection key.*
- *Manuel start-stop.*
- *6 x 9.2mm 3digit 7 segment displays.*
- *Ability to monitor pump operating hours on the screen.*
- *Being able to see the voltage values on the screen.*
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- *Being able to set High Voltage and Low Voltage protection values.*
- *Seeing the pump current values on the screen.*
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- *Possibility to set error delay time.*
- *General Error / Waterless Operation signal warning leds*
- *Protection against waterless operation with float*
- *Additional low current protection against running without water.*
- *All fault conditions can be seen on the screen.*
- *Reporting fault conditions with relay contact.*
- *Separate digital thermal protection for each pump in multiple pumps.*
- *Co-aging feature in multiple pumps (optional).*
- *1 programmable dry contact output.*
- *adjust the star-delta transition time*
- *PTC and Water leakage protection are standard.*

Connection Diagram

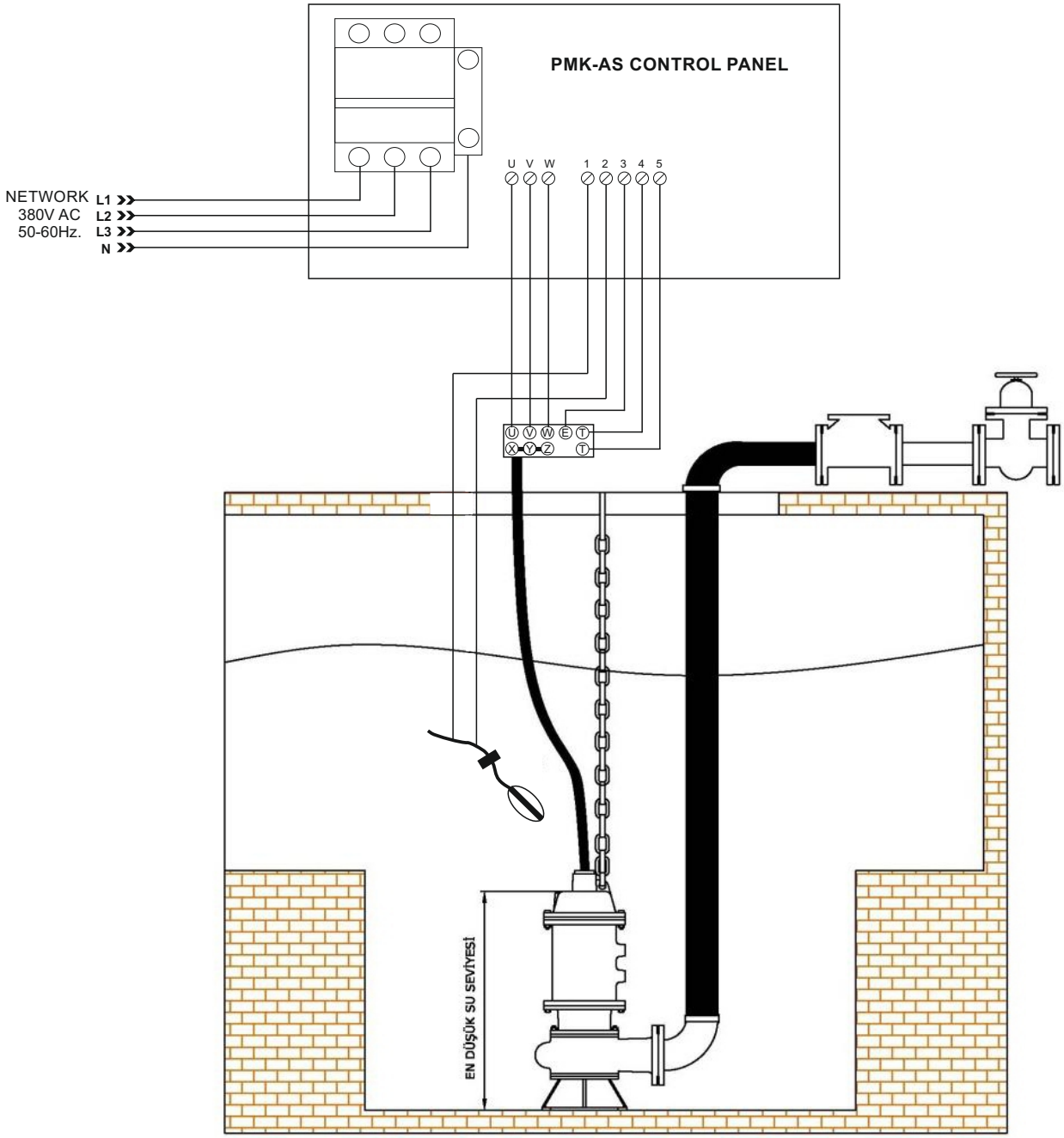

Figure 14: PMK-AS Panel Connection Diagram

Technical Drawings

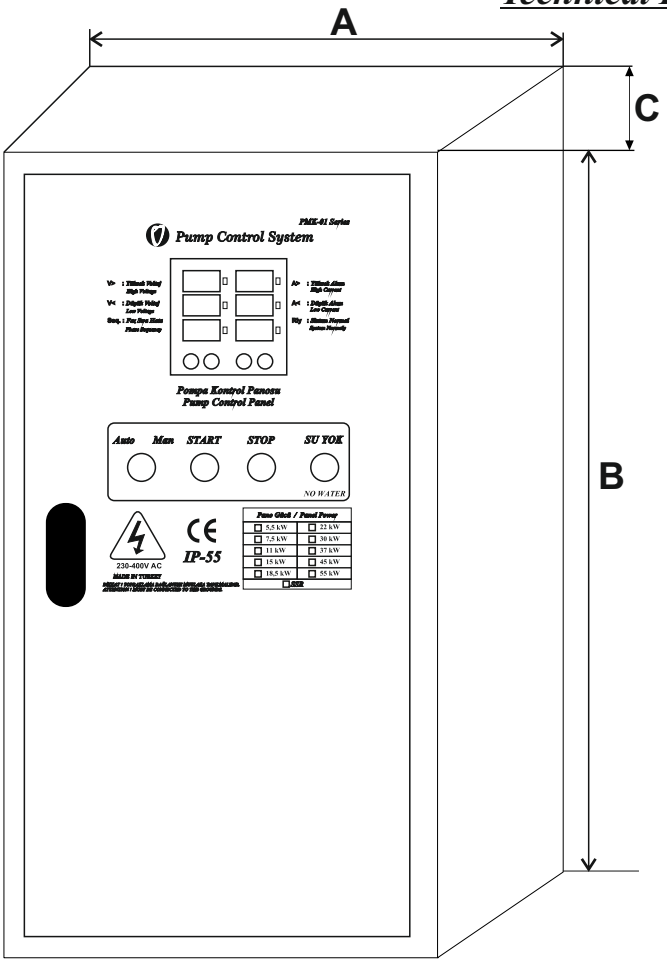

Figure 15: PMK-AS Panel Outer View

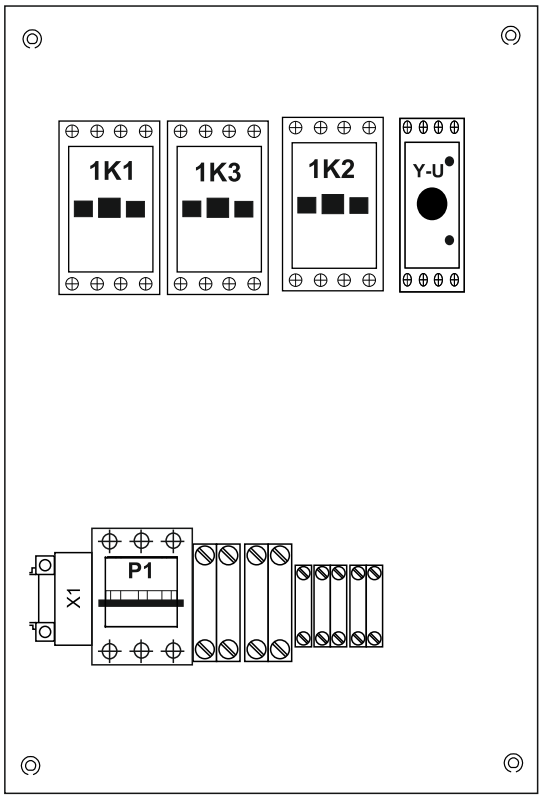

Figure 16: PMK-AS Enclosure Internal View

PMK-AS Panel Dimensions

POWER	A	B	C
7,5kW	300mm	400mm	200mm
11kW	400mm	500mm	200mm
15kW	400mm	500mm	200mm
18kW	400mm	500mm	200mm
22kW	400mm	500mm	200mm
30kW	400mm	600mm	200mm
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75kW	500mm	700mm	260mm
90kW	700mm	1000mm	320mm
110kW	700mm	1000mm	320mm

Technical Drawings

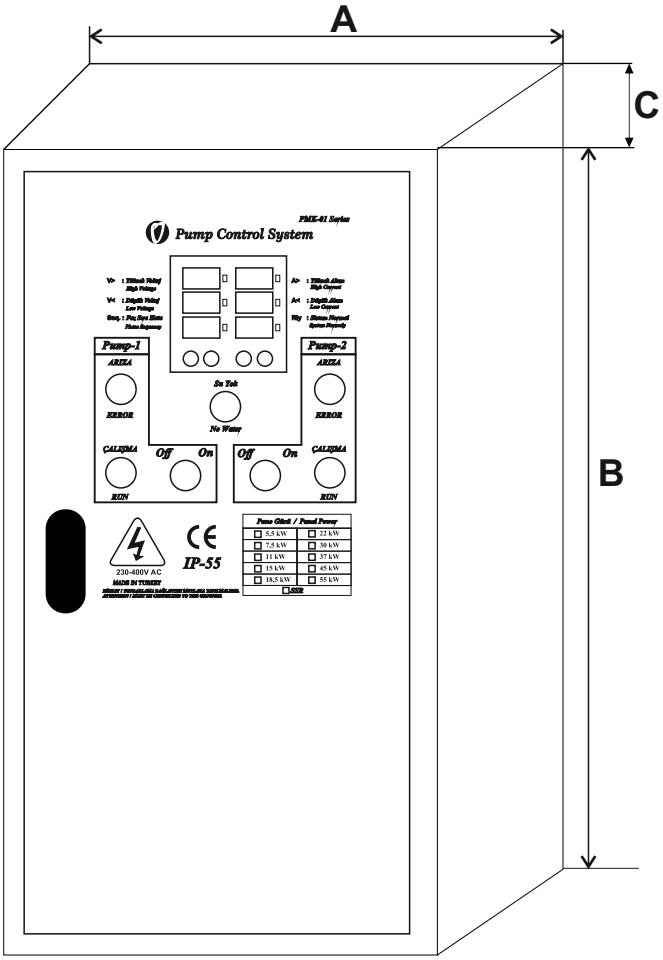

Figure 17: PMKAS-02 Panel Outer View

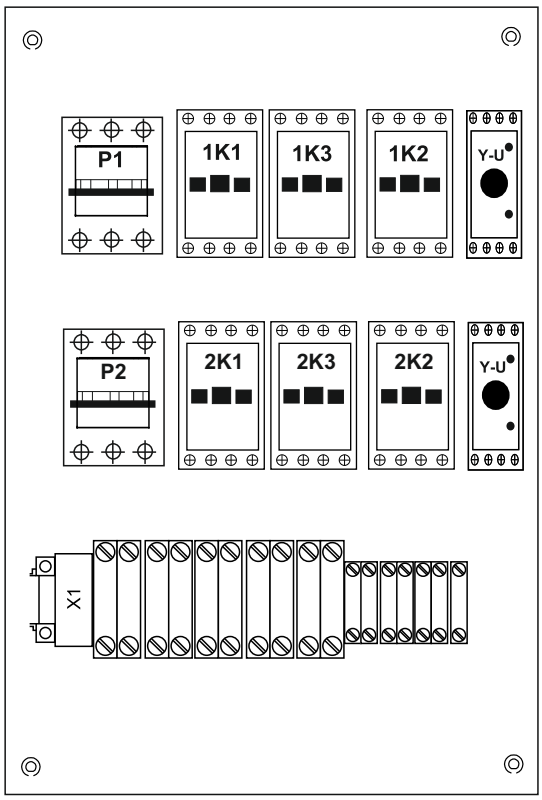

Figure 18: PMKAS-02 Panel Internal View

PMKAS-02 Panel Dimensions

POWER	A	B	C
5,5kW	400mm	500mm	200mm
7,5kW	400mm	600mm	200mm
11kW	400mm	600mm	200mm
15kW	400mm	600mm	200mm
18kW	400mm	600mm	200mm
22kW	400mm	600mm	200mm
30kW	400mm	600mm	200mm
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Connection style	Terminal connection
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Connection Insulation	2.5kV
Assembly	On the pump or on the wall
Protection Class	Ip55
Working Altitude	<2000meter

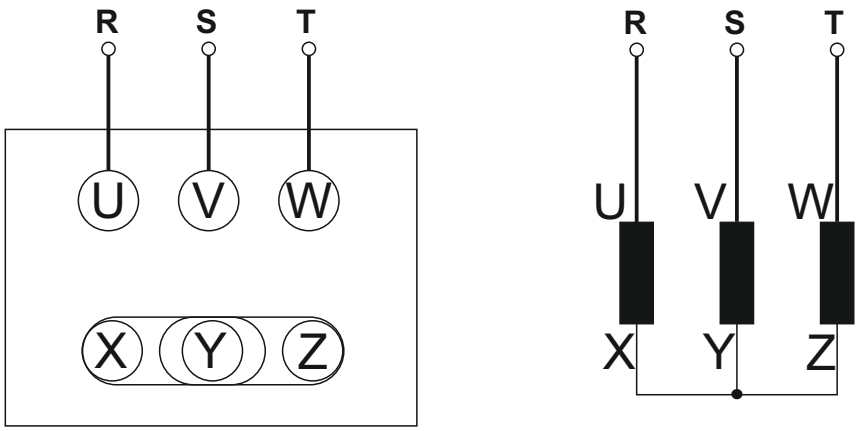

Figure 19: Motor Star (⅄) Connection Diagram

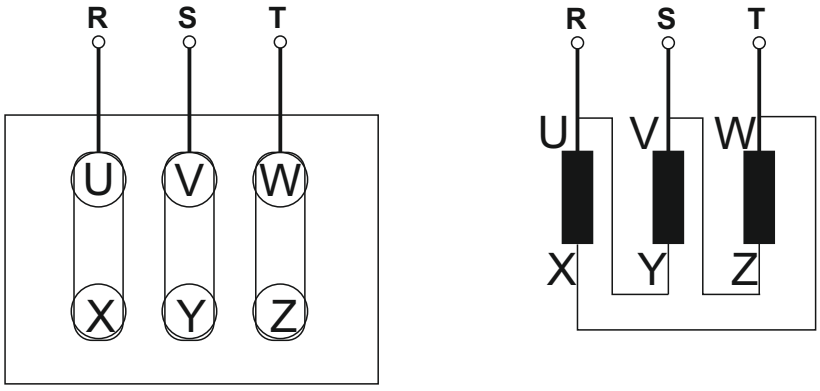

Figure 20: Motor Star (△) Connection Diagram

Star delta starting is the most economical system applied to reduce the starting current in motors. Electric motors draw 5-7 times the rated current from the network at the first start. In order to prevent this, the star-delta starting method is applied to the 3-phase asynchronous motor. In this way, it is prevented that the motors draw high current from the network at the first start-up.

Star delta starting is a combination of 3 contactors and 1 timer. . In order to use this method, the delta-connected operating voltage of the motor must be equal to the mains voltage.For example, the mains voltage in our country is 380V. △ 380V on the motor nameplate must be in writing.

Star delta started motor works in star connection at the moment of start. The voltage applied to the motor windings drops to U/√3 (voltage/root3).The current drawn by the motor decreases to I/√3 value.
As the voltage applied to the windings decreases, the motor torque decreases.

For perfect star delta starting, the load torque of the motor must not be greater than the motor torque in the star connection.

When the star-operated engine speed approaches the rated speed, delta connection should be started. For this reason, a certain period of time is required for the engine to approach its normal speed in star connection.
This time varies according to the engine power and is a maximum of 8-10 seconds. When the motor reaches its normal speed in star connection, if the delta connection is not switched, it works with a torque of 1/3 of the normal operating torque, and if it is loaded with rated load, the motor becomes unable to meet the load torque.

!!! The motor that needs to be connected in delta from the mains can be operated in star connection. In this case, the power and torque of the motor decreases.

ATTENTION: If the motor that should be run in star connection in the network is accidentally started in delta connection,
√3 times greater voltage is applied to the windings and the heat in the motor windings starts to increase after a while, the windings burn out.

Contactor selection is important in star delta starting. A high selected contactor is not economical. The calculation methods while making the selection are as follows.

Energy (main) and current through the delta contactor; It is found by dividing the motor rated current by√3 .
For example, for a motor with a nominal current of 100A: 100/√3 =100/1.732 = 57.7A. Accordingly, a contactor above 57.7A should be selected.

The current passing through the star contactor; 1/3 of the motor rated current. For a motor with a nominal current of 100A: 100/3 = 33.3A. Accordingly, a contactor above 33A should be selected.

According to these results, 65A-65A-40A contactor should be used for the motor with 100A nominal current.

Cos fi : 0,9		Kesit (mm²) Section (mm²)															
Güç Power	Yük Akımı Current load																
kW	A	1,5	2,5	4	6	10	16	25	35	50	70	95	120	150	185	240	300
2,5	4,2	178	291	466	695	1162											
		103	169	271	404	675	1063										
3	5	150	244	391	584	976	1536										
		87	142	227	339	567	892	1391									
3,5	5,9	127	207	331	495	827	1302										
		73	120	192	227	480	756	1180									
4	6,7	111	182	292	435	728	1146										
		65	106	169	253	423	666	1038									
4,5	7,5	100	163	261	389	650	1024										
		58	94	51	226	378	595	927	1266								
5	8,4	89	145	233	347	581	914	1425									
		51	84	135	202	337	531	828	1130								
6	10,1	74	121	193	289	483	760	1185									
		43	70	112	168	200	442	689	940	1247							
7	11,8	63	103	165	247	413	651	1015									
		36	60	96	143	240	378	590	805	1067							
8	13,5	55	90	145	216	361	569	887	1210								
		32	52	84	125	210	330	515	703	932	1301						
9	15,2	49	80	128	192	321	505	787	1075								
		28	46	74	111	186	293	457	625	828	1155						
10	16,8	44	72	116	173	290	457	712	972	1290							
		25	42	67	101	168	265	414	565	750	1045						
12	20	37	61	97	146	244	384	598	817	1083							
		21	35	56	84	141	223	347	474	630	878	1166					
14	23	12	53	85	127	212	334	520	710	942	1315						
		18	30	49	73	123	194	302	413	547	764	1014					
16	27		45	75	108	180	284	443	605	802	1120						
			26	42	62	105	165	257	351	466	650	863	1053				
18	30		40	65	97	162	256	399	544	722	1007						
			23	37	56	94	148	281	316	419	585	777	948	1119			
20	33		37	59	88	147	232	362	495	656	916	1216					
			21	34	51	88	135	210	287	381	532	706	862	1017			
22	37			52	78	111	207	323	441	585	817	1085					
				30	45	76	120	288	256	340	475	630	769	907	1072		
25	42			46	69	116	182	285	389	516	719	955	1165				
				27	40	67	106	165	226	299	418	555	677	799	944	1156	
30	50				58	97	153	239	326	433	605	802	979	1155			
					33	56	89	139	189	251	351	466	569	671	793	971	1124
35	59					82	130	202	277	367	512	680	830	979	1157		
						48	75	117	161	213	297	395	482	569	672	823	952
40	67					72	114	178	243	323	451	599	730	862	1018		
						42	66	103	141	187	262	348	425	501	592	725	838
45	76						101	157	215	285	397	528	644	760	898	1100	
							58	91	124	165	231	306	374	442	522	639	739
50	84						91	142	194	258	359	477	582	688	812	995	1151
							53	82	113	149	209	277	338	400	472	578	669
55	93						82	128	175	233	325	431	526	621	734	898	1040
							48	74	102	135	188	250	305	361	426	522	604
60	101							118	161	214	299	397	484	572	675	827	957
								68	94	124	173	230	281	332	392	481	556
70	118							101	30	183	256	340	414	487	578	708	819
								58	80	106	148	197	241	284	336	411	476
75	126							95	129	172	239	318	388	458	541	663	767
								55	75	99	139	185	225	266	314	385	446
80	135								121	160	223	297	362	427	505	619	716
									70	93	130	172	210	248	293	360	416
90	152								107	142	198	172	322	380	449	549	636
									62	82	115	264	187	220	261	319	369
100	169									128	178	153	289	341	403	495	572
										74	103	237	168	198	234	287	332
110	185									117	163	138	264	312	369	451	522
										68	94	216	153	181	214	262	303
130	219										138	126	223	263	311	381	441
											80	183	129	153	181	221	256
133	224										134	106	218	257	304	373	431
											78	179	127	149	177	216	250
150	253											104	193	228	269	330	382
												158	112	132	156	192	222
160	270											92	181	213	252	309	358
												148	105	124	146	179	208
180	303											86	161	190	225	275	319
													93	110	130	160	185
200	337													171	202	248	286
														99	117	144	166
205	346													166	197	241	279
														97	114	140	162
230	386														175	215	249
															102	125	145
270	456															183	212
																106	123
280	472																205
																	119
290	490																197
																	114
300	506																191
																	111
305	515																187
																	109

3 - 380 V
Gerilim düşümü <%5
Gerilim düşümü <%3
Voltage drop

PANEL POWER AND CURRENT TABLE

MOTOR POWER		OPERATING VOLTAGE	STARTING TYPE	RATED CURRENT
HP	KW			
5,5	4	380/220V AC	DIRECT	9 A
7,5	5,5	380/220V AC	DIRECT	12 A
10	7,5	380/220V AC	DIRECT	16 A
15	11	380/220V AC	DIRECT	25 A
10	7,5	380/220V AC	START-DELTA	18 A
15	11	380/220V AC	START-DELTA	25 A
20	15	380/220V AC	START-DELTA	30 A
25	18,5	380/220V AC	START-DELTA	36 A
30	22	380/220V AC	START-DELTA	42 A
40	30	380/220V AC	START-DELTA	56 A
50	37	380/220V AC	START-DELTA	68 A
60	45	380/220V AC	START-DELTA	82 A
75	55	380/220V AC	START-DELTA	105 A
100	75	380/220V AC	START-DELTA	134 A
125	90	380/220V AC	START-DELTA	164 A
150	110	380/220V AC	START-DELTA	191 A
180	132	380/220V AC	START-DELTA	229 A
220	160	380/220V AC	START-DELTA	273 A
270	200	380/220V AC	START-DELTA	341 A
340	250	380/220V AC	START-DELTA	426 A
430	315	380/220V AC	START-DELTA	531 A
480	355	380/220V AC	START-DELTA	603 A
540	400	380/220V AC	START-DELTA	680 A

Panel selections should be made according to the nominal current value on the motor nameplate.

BlackSTN®
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