AYVAZ

KP-01

GALAXY CAPACITIVE LEVEL ELECTRODE

GENERAL FEATURES

Ayvaz KP-01 Capacitive Level Controller works according to capacitance measurement principle. It is used to display continuous levels in conductive and non-conductive liquids. KP-01 comprises a level transmitter which is integrated into the electrode that produces a standard analog signal of 4-20mA. Analog output of 4-20mA can be monitored from the display located on the panel protection box. KP-01's display both 4-20mA analog output and liquid level as percentage in tank or the boiler. A specially designed and winglet-fit cooling pipe is used for heat insulation of the electrode.

Capacitance measurement principle is used to indicate the level. Electrode rod and vessel wall form a capacitor. It is basically based on the fact that the value of a capacity is affected by dielectric value of the substance between the plates and from the plate areas, as well as from the distance between them.As the area of the electrode and tank wall is fixed, the only variable thing is the substance inside the tank which plays a dielectric role.

If the level of such dielectric substance changes, the current running through the plates would change proportionately, as well. A dielectric is defined as an insulating substance which keeps many liquids such as water outside.

Dielectric constant of air and vacuum is 1 while it is bigger than 1 for other substances and therefore, capacity changes in line with the change in amount of the substance inside the tank. In order to obtain a useful result of measurement, measuring rod (dip stick) dipped at various depths into liquids must be insulated entirely. After zero point measuring range is adjusted, level can be read through the display unit.

Application Areas

- Steam Boilers
- Supply Tanks
- Concrete Tank
- Plastic Tanks
- Chemical Industry
- Food Industry
- Marine
- Pharmautical Industry

PRODUCT FEATURES	
Body	AISI 316 Ti
Elec. Box	Aluminium
Flange	Forged Steel
Electrode	AISI 316 Ti
Electrode Insulation	PTFE
Connection	3/4" BSP / DN32-50 PN40 Flanged
Intermediate Disc	PTFE
Max. Working Temp.	238°C
Max. Working Pressure	32 Bar
Thermal Fuse	115°C
Supply	230 V (Opt. 115V, 24V)+ %10, 50-60 Hz
Power Consumption	5 VA
Precision	Degree 1: Water > 0.5 µS
	Degree 2: Water >0.20 Ms
	Degree 3: Fuel oil or 2,3
Output	4-20 mA Analog and Proportional
Protection Class	IP44

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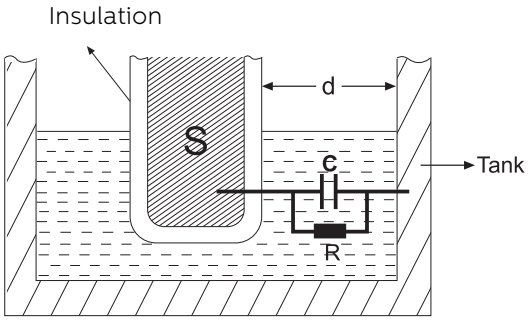
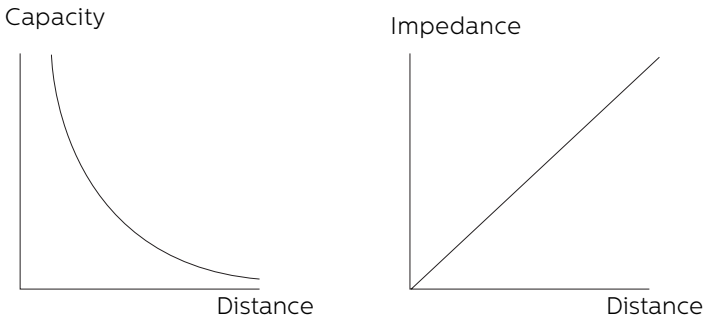
Working Principle:
To define electrical capacity, we assume that two conductive plates are used;



C(Farad)
S,d (mt)

$$C = \frac{\varepsilon_o.\varepsilon_r.S}{d}$$

Due to leakage currents and the distance (d) between tank and probe is relatively high, above equation is not practical to use. Therefore, instead of electrical capacity, impedance measurement will provide accurate level results.



Impedance is $Z = R + jL\omega + (jC\omega)^{-1}$. R is defined as reel component and represents the medium conductivity.

jLw is the second component and defined as inductive reactance. This component is ignored. Hence, the chance of extra error due to electrostatic measuring is removed. Findal impedance formula becomes as follow Z= R + (jCω) -1. The capacitive level measurement we manufacture works on the transfer of electrical charges principle.
Total impedance is defined as Z=V / I.
I (Current) I=Q / t
Q (Coulomb)
t (sn)

(jCω)-1 is the capacitive reactance we want to measure. So, electrical charges and impedance are on the same phases. In brief, electrical charges flowed into medium are directly proportional with capacitive reactance.
For coaxial sensor;

a= Radius of electrod
b= Radius of insulated electrod
L= Length

Impedance can be defined as follows: $\frac{2.\pi.\varepsilon_o.\varepsilon_r}{\ln (b/a)}.L$

Excitation applied between 10KHz.250KHz based on length for all our models. ω == 2 x p x f) Linearity error that may be caused by conductivity component (R) effect is prevented by electronic circuit design and mechanical design. Reduced to a level lower than 1ppm, acceptable as zero.

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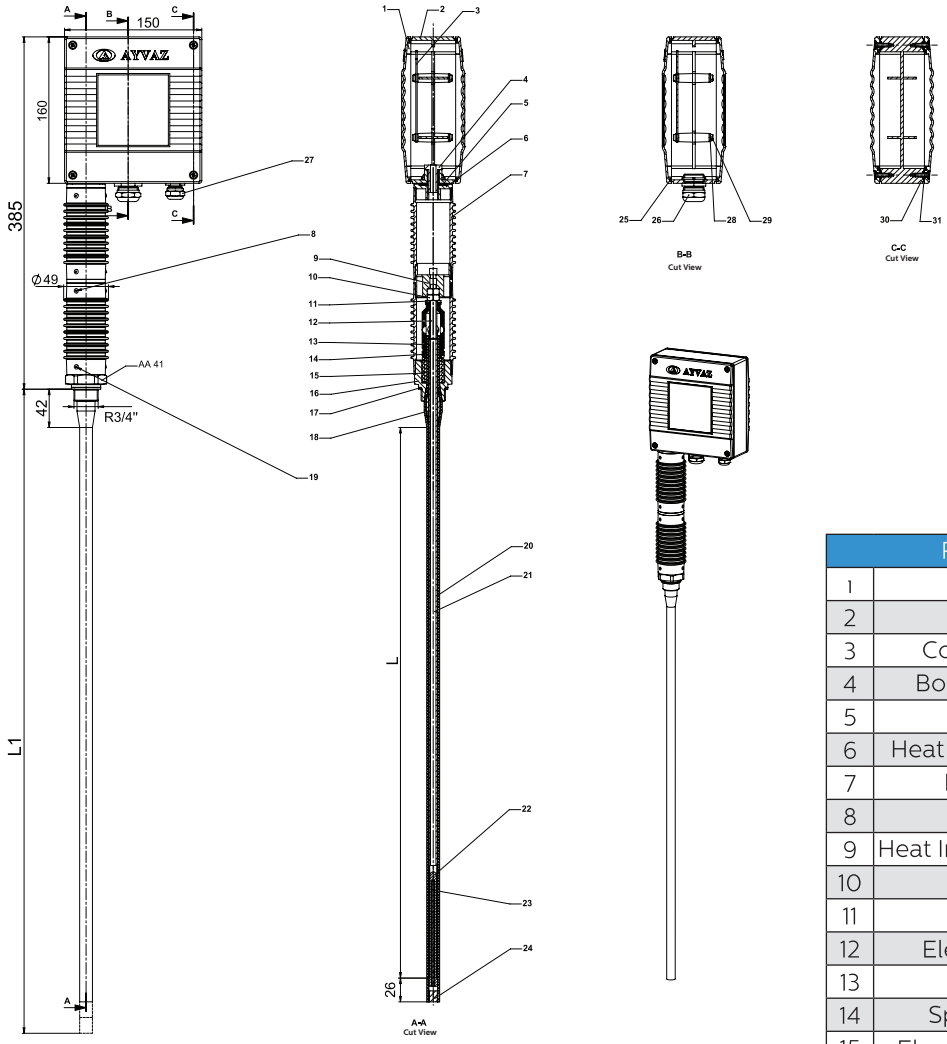
TECHNICAL SPECIFICATION - THREADED



L (mm)	L1 (mm)
300	373
400	477
500	583
600	688
700	794
800	899
900	1004
1000	1110
1100	1214
1200	1319
1300	1423
1400	1528
1500	1636
2000	2156

	Part No / Name	Material
1	Cover	Aluminium
2	Board Body	Aluminium
3	Control Board Circuit	Stripboard
4	Board Connection Bolt	8.8
5	Bolt Gasket	Lastik
6	Heat Insulation Pipe Cover	Castermid
7	Heat Insulation Pipe	Aluminium
8	Rivet	
9	Heat Insulation Pipe Connec.	Castermid
10	A.K.B. Nut	
11	Washer	
12	Electrode Fixing Bolt	AISI 316
13	Electrode Fixing	Peek
14	Spring Pressure Bear	AISI 304
15	Electrode Pressure Spring	AISI 302
16	Electrode Body	AISI 316
17	Electrode Body Gasket	AISI 304
18	Fixing Part	AISI 316
19	Rivet	Ø2x4
20	PFA Insulation	PFA
21	Electrode Pipe	AISI 316
22	Wire Cover	Teflon
23	Wire	Weld Wire
24	Stopper	PFA
25	Board Cover Gasket	Silicon
26	Raccord	
27	Raccord	
28	Washer	
29	Cylindrical Head Bolt	
30	Gasket	
31	Countersunk Bolt	

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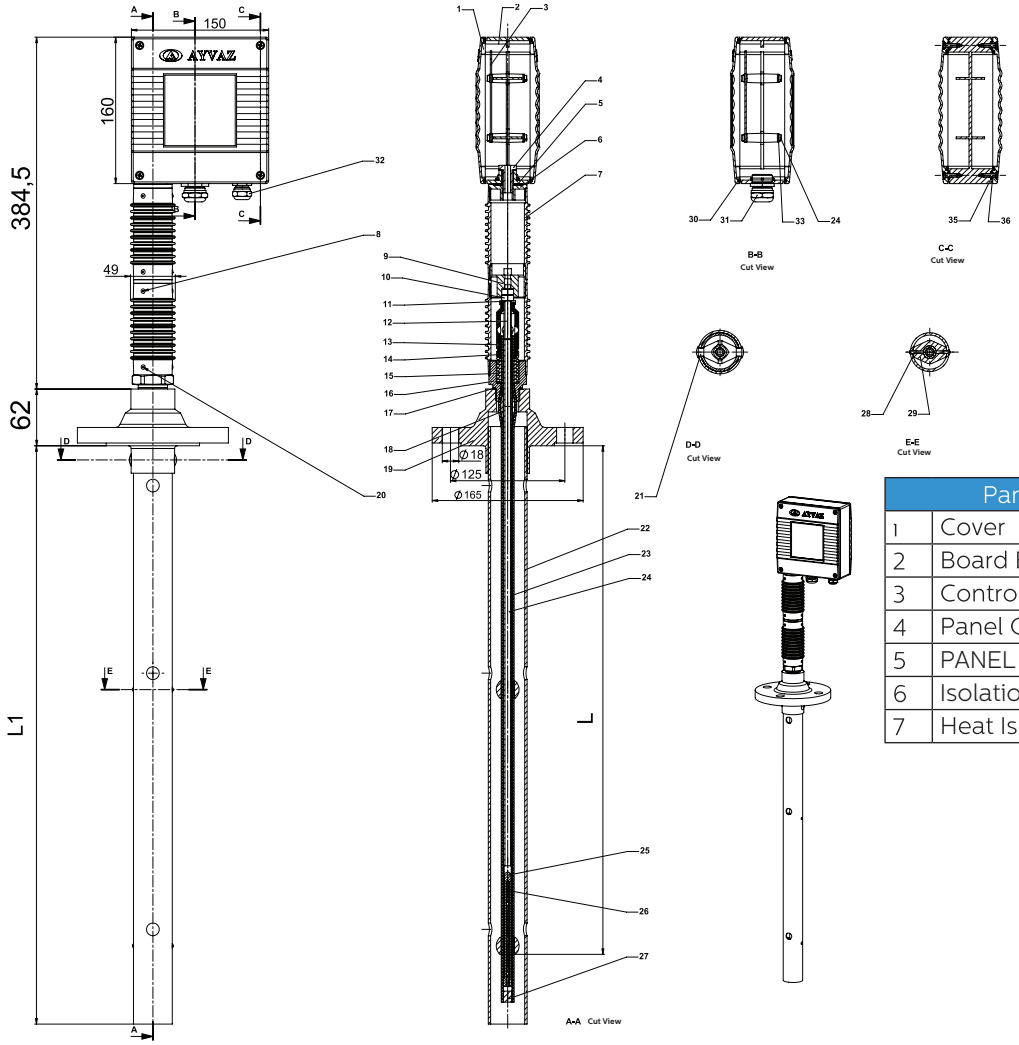
TECHNICAL SPECIFICATION - FLANGED



	Part No / Name	Material
1	Cover	Aluminium
2	Board Body	Aluminium
3	Control Panel Circuit	Stripboard
4	Panel Connector Bolt	8.8
5	PANEL GASKET	Lastic
6	Isolation pipe cap	Castermid
7	Heat Isolation Pipe	Aluminium

L (mm)	L1 (mm)
275	316
375	420
475	526
575	631
675	737
775	842
875	947
975	1053
1075	1157
1175	1262
1275	1366
1375	1471
1475	1579
1975	2099

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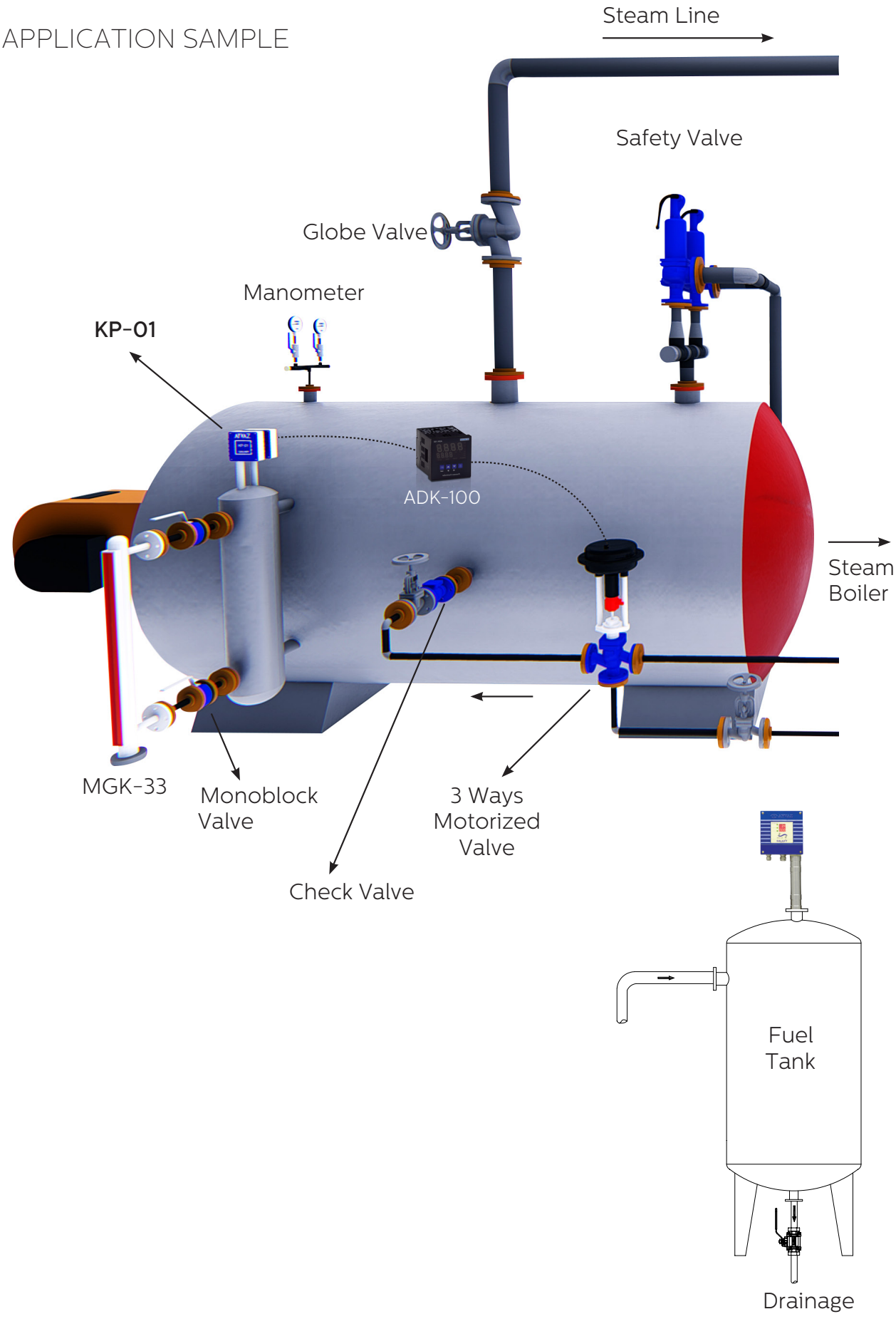
3D APPLICATION SAMPLE



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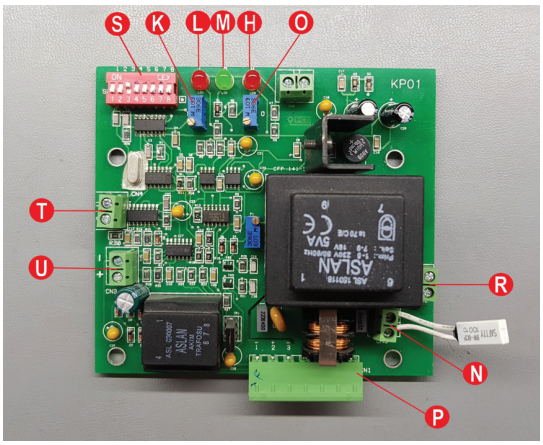
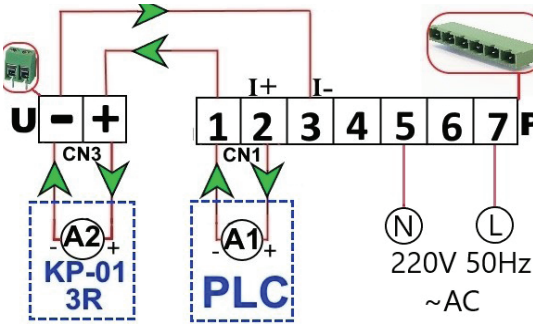
KP-01 ELECTRICAL CONNECTION

-S= Measuring degree DIP switch (SW 1)
-K= Lower measuring point potentiometer
-L= LED “Level 0%”s
-M= LED “Level > 0%, < 100%
-H= LED "Level 100%"
-O= Upper measuring point potentiometer
-N= Thermal fuse Tmax = 115° C
-P= Power (220V AC 50Hz) and (4-20mA) Current Connection Terminal
-R= KP01-3R Power Connection Terminal
-T= Electrode rod connection terminal
-U= 4-20mA Current Connection Terminal of KP01-3R board



For electrical connection, minimum 1.5 mm2 multi-core cable should be used.

KP-01 3R



24V DC' is suitable

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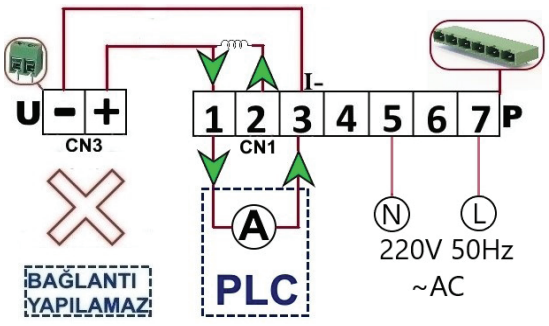

24V DC is suitable

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