



Alpha Engineering & Systems

TEMPERATURE SENSORS



YOUR **TRUSTED PARTNER**
FOR MORE THAN
30 YEARS



RESISTANCE TEMPERATURE DETECTOR (RTD)

Temperature measuring sensors which use the correlation between metal resistance and temperature to measure the temperature of a body. As metal temperature increases its electric resistance also increases. It means temperature.

RTD's are available in all accuracy class (refer below table) as per DIN 43760 / IEC 60751

Specifications

Type	MI Type / Non MI Type
Configuration	Simplex / Duplex with 2 wire, 3 wire & 4 wire
Temperature Range	Industrial : -200° C to 650° C
Accuracy	Class A, Class B
Sheath Material	SS316, SS316L, SS304
Sheath Diameter	3, 4.5, 6, 8, 10; Other on request
Sheath Length	25mm to 40meter; Other on request
Enclosure Material	Die cast Aluminium / SS316 / SS304
Enclosure Approval	PESO / CCOE / ATEX / IP etc.

Tolerance / +°c		
°C	Class B	Class A
-200	1.3	0.55
-100	0.8	0.35
0	0.3	0.15
100	0.8	0.35
200	1.3	0.55
300	1.8	0.75
400	2.3	0.95
500	2.8	1.15
600	3.3	1.35
650	3.6	1.45



► THERMOCOUPLE

- Two dissimilar metals which are joined at one end forming a hot junction and the open wire end acting as the cold junction. When hot junction gets heated, a voltage difference will occur between both junctions due to the electromotive force.

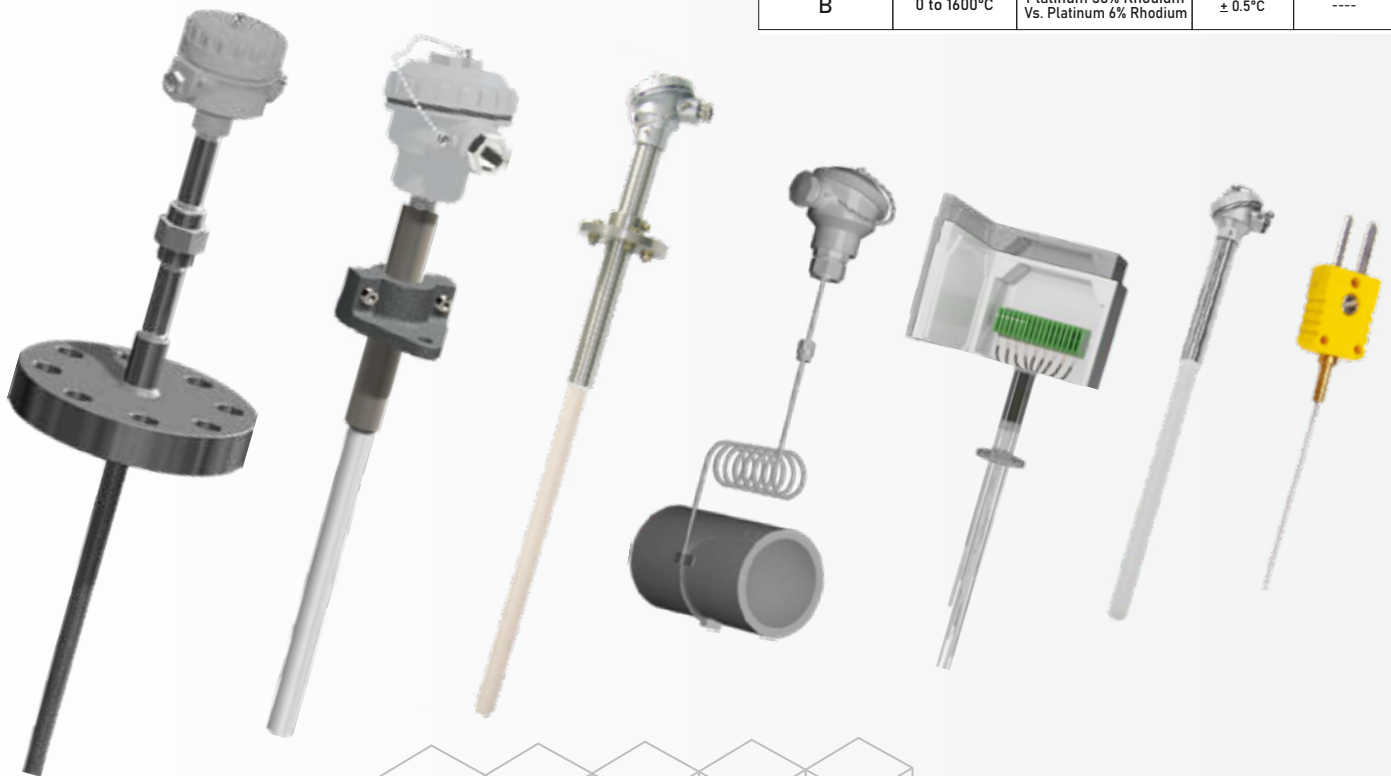
Thermocouples are available in both accuracy (Standard & Special) as per IEC 60584 / ANSI MC 96.1 & IS 7358.

- Base metal thermocouples (K, J, T, E, N)
- Noble metal thermocouples (R, S, B)
- Special thermocouples on customer requirements.

Specifications

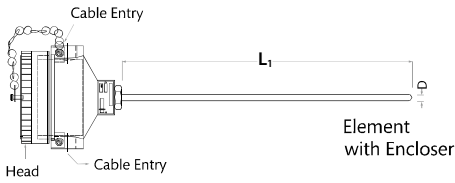
Type	MI Type / Non MI Type
Configuration	Simplex / Duplex / Triplex or on request
Temperature Range	As per thermocouple table
Accuracy	Class 1, Class 2
Sheath Material	SS316, SS310, Inconel 600, HRS446, etc.
Sheath Diameter	3, 4.5, 6, 8, 10, 12, 16, 18, 22, 25 or on request
Sheath Length	20 mm to 60 meter or on request
Enclosure Material	Die cast Aluminium / SS316 / SS304
Enclosure Approval	PESO / CCOE / ATEX / IP etc.

Thermocouple Conductor Combinations, Operating Range & Accuracy				
Thermocouple Type	Temperature Range (Continuous)	Conductors +/-	Accuracy	
			Standard	Special
K	-200 to 1260°C	Nickel-Chromium Vs. Nickel-Aluminium	± 2.2°C or ± 0.75%	± 1.1°C or ± 0.4%
T	-200 to 370°C	Copper Vs. Copper-Nickel	± 1.0°C or ± 0.75%	± 0.5°C or ± 0.4%
J	0 to 760°C	Iron Vs. Copper-Nickel	± 2.2°C or ± 0.75%	± 1.1°C or ± 0.4%
N	-200 to 1260°C	Nicrosil Vs. Nisil	± 2.2°C or ± 0.75%	± 1.1°C or ± 0.4%
E	-200 to 870°C	Nickel-Chromium Vs. Copper-Nickel	± 1.7°C or ± 0.5%	± 1.0°C or ± 0.4%
R	0 to 1450°C	Platinum 13% Rhodium Vs. Platinum	± 1.5°C or ± 0.25%	± 0.6°C or ± 0.1%
S	0 to 1550°C	Platinum 10% Rhodium Vs. Platinum	± 1.5°C or ± 0.25%	± 0.6°C or ± 0.1%
B	0 to 1600°C	Platinum 30% Rhodium Vs. Platinum 6% Rhodium	± 0.5°C	----

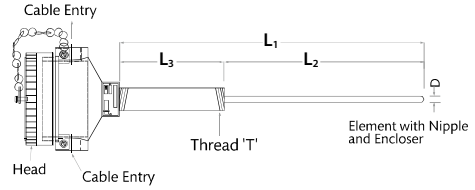


AES - 100 SERIES TEMPERATURE ELEMENTS

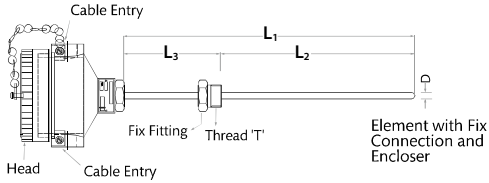
AES-101 WITHOUT THREAD TYPE



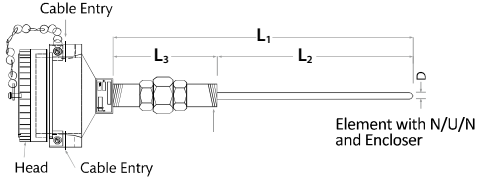
AES-104 THREAD ON NIPPLE TYPE



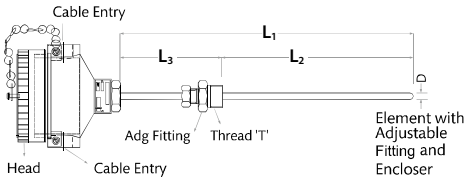
AES-102 FIXED THREAD TYPE



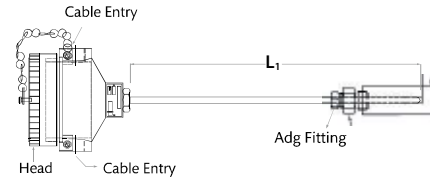
AES-105 THREAD WITH N-U-N



AES-103 ADJUSTABLE THREAD TYPE



AES-106 ELEMENT WITH WELDPAD



SERIES BIFURICATION

AES101
AES 102
AES 103
AES 104
AES 105
AES 106

CODE TYPE OF SENSORS

J IRON-CONSTANT
K CHROMEL-ALUMEL
T COPPER-CONSTANTON
E CHROMEL-CONSTANTION
N NICROSIL-NISIL
R PRTH 13% PT
S PRTH 10% PT
B PRTH 30% - PRTH 6%
PT 100 PT 100 RTD
PT 200 PT 200 RTD
PT 1000 PT 1000 RTD

NO OF ELEMENT

1 SIMPLEX
2 DUPLEX

SHEATH MOC

S4 SS-304
S6 SS-316
I6 INCONEL-600
S46 SS-446
S10 SS-310

SHEATH DIA 'D'

SPECIFY IN MM

TOTAL LENGTH 'L1'

SPECIFY IN MM

INSERTION LENGTH 'L2'

SPECIFY IN MM

EXTENSION LENGTH 'L3'

SPECIFY IN MM

CODE SPECIAL REQUIRMENT

1 STANDAD CALIBRATION CERTIFICATE
2 NABL CALIBRATION CERTIFICATE
3 ATEX CERTIFICATE

OTHER OPTION

0 NON
T TRANSMITTER

CODE GLAND MATERIAL

A BRASS
B SS 304
C SS 316
D PLASTIC

CODE TYPE OF GLAND

SC SINGLE COMPRESSION
DC DOUBLE COMPRESSION
N PG

CODE NO. CABLE ENTRY

1 ONE ENTRY
2 TWO ENTRY

CODE HEAD MOC

A DIE CAST ALUMINIUM
B HEAD IN SS 304
C HEAD IN SS 316

HEAD TYPE

WP WEATHER PROOF HEAD
FL FLAME PROOF IIA IIB HEAD
EX EXPLOSION PROOF IIC HEAD

CODE MOUNTING THREADS

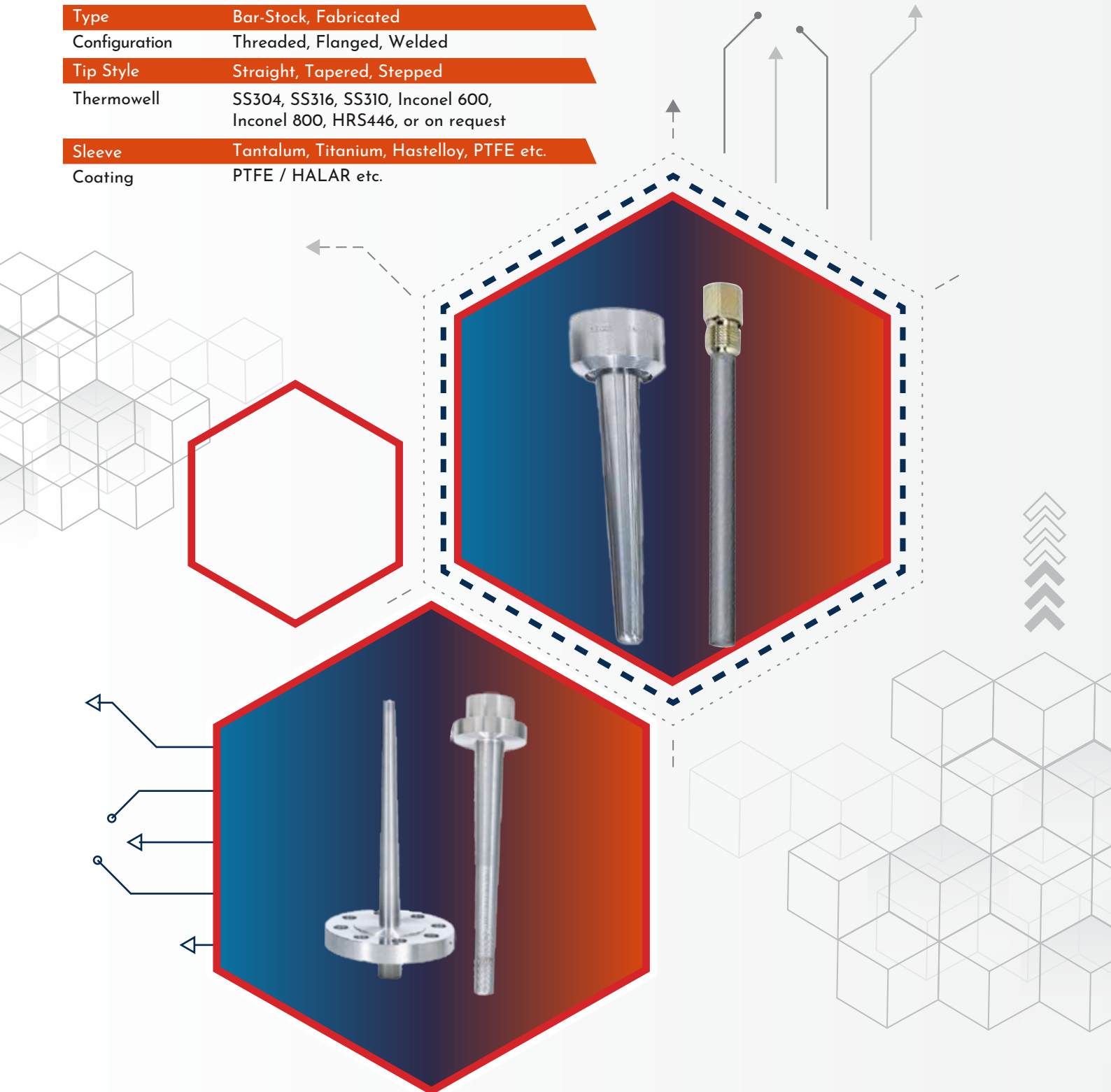
6NTM 1/4" NPT (M)
6BPM 1/4" BSP (M)
12NTM 1/2" NPT (M)
12BPM 1/2" BSP (M)
19NTM 3/4" NPT (M)
19BPM 3/4" BSP (M)
25NTM 1" NPT (M)
25BPM 1" BSP (M)

► THERMOWELL

- To protect temperature sensores (RTD / Thermocouple), A thermowell is used as a protection tube which is closed from one end.
- Thermowell is available in many designs & materials according to applications / process requirements.

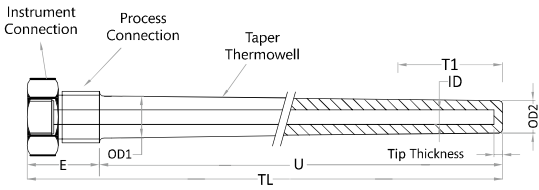
Specifications

Type	Bar-Stock, Fabricated
Configuration	Threaded, Flanged, Welded
Tip Style	Straight, Tapered, Stepped
Thermowell	SS304, SS316, SS310, Inconel 600, Inconel 800, HRS446, or on request
Sleeve	Tantalum, Titanium, Hastelloy, PTFE etc.
Coating	PTFE / HALAR etc.

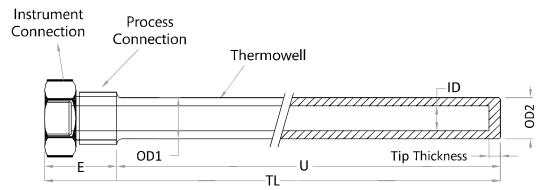


AES - 200 SERIES THERMOWELL

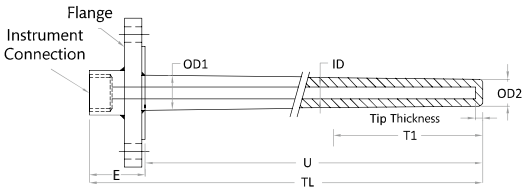
AES-201 THREADED TAPER THERMOWELL



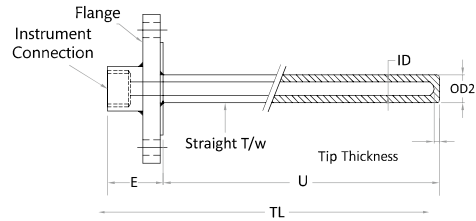
AES-202 THREADED STRAIGHT THERMOWELL



AES-203 FLANGED TAPERED THERMOWELL



AES-204 FLANGED STRAIGHT THERMOWELL



SERIES BURIFICATION

AES-201
AES-202
AES-203
AES-204

CONSTRUCTION

T THEADED
F FLANGED

CODE THERMOWELL MOC

S16 SS316
S16L SS316L
SS21 SS321
SS10 SS310
S04 SS304
S46 HRS 446
160 INCONEL 600
180 INCONEL 800
OTHER SPECIFY

THERMOWELL DIA 'OD1'

SPECIFY IN MM

THERMOWELL DIA 'OD2'

SPECIFY IN MM

THERMOWELL DIA 'ID'

SPECIFY IN MM

TIP THICKNESS

SPECIFY IN MM

PROCESS CONN.

F1	1/2" 150 # FLANGE	T1	1/2" BSP (M)
F2	3/4" 150 # FLANGE	T2	1/2" NPT (M)
F3	1" 150 # FLANGE	T3	3/4" BSP (M)
F4	1.5" 150 # FLANGE	T4	3/4" NPT (M)
F5	2" 150 # FLANGE	T5	1" BSP (M)
F6	1/2" 300 # FLANGE	T6	1" NPT (M)
F7	3/4" 300 # FLANGE	T7	1.5" BSP (M)
F8	1" 300 # FLANGE	T8	1.5" NPT (M)
F9	1.5" 300 # FLANGE	T9	2" BSP (M)
F10	2" 300 # FLANGE	T10	2" NPT (M)

TOTAL LENGTH 'TL' (U+E)

SPECIFY IN MM

EXT. LENGTH 'E'

SPECIFY IN MM

IMM. LENGTH 'U'

SPECIFY IN MM

INSTRUMENT CONN. CODE

12 BPF	1/2" BSP(F)
12NTF	1/2" NPT (F)
19BPF	3/4" BSP(F)
19NTF	3/4" NPT(F)
OTHER SPECIFY	

► Temperature Table for RTDs and T/Cs

► The following table provides reference for specific types of RTDs and T/Cs

Temp °C	Temperature Vs Resistance (ohm)					Temp °C	Temperature Vs Thermoelectric Voltage (mV)							
	PT-46	PT-100	PT-200	CU-53	NI-100		B	E	J	K	N	R	S	T
-200	8.519	18.250	37.040	-	-	-200	-	-8.825	-7.890	-5.891	-3.990	-	-	-
-190	10.502	22.830	45.660	-	-	-190	-	-8.561	-7.659	-5.730	-3.884	-	-	-
-175	13.441	29.220	58.440	-	-	-150	-	-7.279	-6.500	-4.913	-3.336	-	-	-
-150	18.271	39.720	79.440	-	-	-125	-	-6.314	-5.616	-4.276	-2.902	-	-	-
-125	23.028	50.060	100.120	-	-	-100	-	-5.237	-4.633	-3.554	-2.407	-	-	-
-100	27.720	60.260	120.520	-	-	-75	-	-4.058	-3.566	-2.755	-1.659	-	-	-
-60	35.112	76.330	152.660	-	69.52	-50	-	-2.787	-2.431	-1.889	-1.269	-0.226	-0.236	-1.819
-50	36.943	80.310	160.620	41.685	74.255	-40	-	-2.255	-1.961	-1.527	-1.023	-0.188	-0.194	-1.475
-40	38.764	84.270	168.540	43.948	79.131	-25	-	-1.432	-1.288	-0.968	-0.646	-0.123	-0.127	-0.940
-30	40.581	88.220	176.440	46.211	84.146	0	-	0.000	0.0000	0.000	0.000	0.000	0.000	0.000
-25	41.487	90.190	180.380	47.342	86.704	25	-	1.495	1.277	1.000	0.659	0.141	0.143	0.992
-20	42.394	92.160	184.320	48.474	89.296	50	-	3.048	2.585	2.023	1.340	0.296	0.299	2.036
-10	44.201	96.090	192.180	50.737	94.582	75	-	4.656	3.918	3.059	2.045	0.466	0.467	3.132
0	46.000	100.000	200.000	53.000	100.000	100	-	6.319	5.269	4.096	2.774	0.647	0.646	4.279
10	47.794	103.900	207.800	55.263	105.552	125	-	8.031	6.634	5.124	3.527	0.839	0.834	5.470
20	49.583	107.790	215.580	57.526	111.236	150	-	9.789	8.010	6.138	4.302	1.041	1.029	6.704
25	50.476	109.730	219.460	58.658	114.129	175	-	11.587	9.392	7.140	5.098	1.254	1.232	7.977
30	51.368	111.670	223.340	59.789	117.056	200	-	13.421	10.779	8.138	5.913	1.469	1.441	9.288
40	53.148	115.540	231.080	62.052	123.011	225	-	15.287	12.167	9.141	6.747	1.693	1.655	10.634
50	54.924	119.400	238.800	64.316	129.105	250	0.291	17.181	13.555	10.153	7.597	1.923	1.874	12.013
60	56.690	123.240	246.480	66.579	135.340	260	0.317	17.945	14.110	10.561	7.941	2.017	1.962	12.574
70	58.457	127.080	254.160	68.842	141.721	275	0.358	19.098	14.942	11.176	8.462	2.159	2.096	13.423
75	59.335	128.990	257.980	69.973	144.967	300	0.431	21.036	16.327	12.209	9.341	2.401	2.323	14.862
80	60.214	130.900	261.800	71.105	148.251	325	0.510	22.993	17.710	13.248	10.233	2.646	2.553	16.327
90	61.967	134.710	269.420	73.368	154.936	350	0.596	24.964	19.090	14.293	11.136	2.896	2.786	17.819
100	63.715	138.510	277.020	75.631	161.781	390	0.746	28.146	21.297	15.975	12.603	3.304	3.164	20.255
110	65.453	142.290	284.580	77.894	168.792	400	0.787	28.946	21.848	16.397	12.974	3.408	3.259	20.872
120	67.192	146.070	292.140	80.157	175.978	425	0.891	30.952	23.228	17.455	13.906	3.669	3.500	-
125	68.057	147.950	295.900	81.289	179.638	450	1.002	32.965	24.610	18.516	14.848	3.933	3.742	-
130	68.922	149.830	299.660	82.420	183.345	475	1.119	34.983	25.998	19.579	15.794	4.201	3.987	-
140	70.647	153.580	307.160	84.683	190.902	500	1.242	37.005	27.393	20.644	16.748	4.471	4.233	-
150	72.372	157.330	314.660	86.947	198.658	525	1.371	39.029	28.798	21.710	17.707	4.745	4.482	-
160	74.083	161.050	322.100	89.210	206.622	550	1.505	41.053	30.216	22.776	18.672	5.021	4.732	-
170	75.794	164.770	329.540	91.473	214.806	575	1.646	43.075	31.650	23.842	19.641	5.301	4.984	-
175	76.645	166.620	333.240	92.604	218.984	600	1.792	45.093	33.102	24.905	20.613	5.583	5.239	-
180	77.501	168.480	336.960	93.736	223.221	625	1.944	47.107	34.575	25.967	21.588	5.869	5.495	-
200	80.896	175.860	351.720	-	-	650	2.101	49.116	36.071	27.025	22.556	6.157	5.753	-
225	85.105	185.010	370.020	-	-	675	2.263	51.118	37.590	28.079	23.546	6.448	6.013	-
250	89.286	194.100	388.200	-	-	700	2.431	53.112	39.132	29.129	24.527	6.743	6.275	-
275	93.426	203.100	406.200	-	-	725	2.604	55.100	40.696	30.174	25.508	7.040	6.539	-
300	97.543	212.050	424.100	-	-	750	2.782	57.080	42.281	31.213	26.491	7.340	6.806	-
325	101.619	220.910	441.820	-	-	775	2.965	59.053	43.881	32.247	27.473	7.644	7.074	-
350	105.671	229.720	459.440	-	-	800	3.154	61.017	45.494	33.275	28.455	7.950	7.345	-
375	109.682	238.440	476.880	-	-	825	3.347	62.974	47.109	34.297	29.436	8.259	7.618	-
400	113.661	247.090	494.180	-	-	850	3.546	64.922	48.715	35.313	30.416	8.571	7.893	-
425	117.608	255.670	511.340	-	-	900	3.957	68.787	51.877	37.326	32.371	9.205	8.449	-
450	121.523	264.180	528.360	-	-	950	4.387	72.603	54.956	39.314	34.319	9.850	9.014	-
475	125.401	272.610	545.220	-	-	1000	4.834	-	57.953	41.276	36.256	10.506	9.587	-
500	129.251	280.980	561.960	-	-	1050	5.299	-	60.890	43.211	38.179	11.173	10.168	-
525	133.064	289.270	578.540	-	-	1100	5.780	-	63.792	45.119	40.087	11.850	10.757	-
550	136.845	297.490	594.980	-	-	1150	6.276	-	66.679	46.995	41.976	12.535	11.351	-
575	140.590	305.630	611.260	-	-	1200	6.786	-	69.553	48.838	43.846	13.228	11.951	-
600	144.307	313.710	627.420	-	-	1250	7.311	-	-	50.644	45.694	13.926	12.554	-
625	147.991	321.720	643.440	-	-	1300	7.848	-	-	52.410	47.513	14.629	13.159	-
650	151.634	329.640	659.280	-	-	1350	8.397	-	-	54.138	-	15.334	13.766	-
675	155.250	337.500	675.000	-	-	1400	8.956	-	-	-	-	16.040	14.373	-
700	158.829	345.280	690.560	-	-	1450	9.524	-	-	-	-	16.746	14.978	-
725	162.375	352.990	705.980	-	-	1500	10.099	-	-	-	-	17.451	15.582	-
750	165.894	360.640	721.280	-	-	1550	10.679	-	-	-	-	18.152	16.182	-
775	169.372	368.200	736.400	-	-	1600	11.263	-	-	-	-	18.849	16.777	-
800	172.822	375.700	751.400	-	-	1650	11.848	-	-	-	-	19.540	17.366	-
825	176.235	383.120	766.240	-	-	1700	12.433	-	-	-	-	20.222	17.947	-
850	179.621	390.480	780.960	-	-	1750	13.014	-	-	-	-	20.877	18.503	-

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- ▶ Telemetry Peizometer, Telemetry Flow Meter & Telemetry Radar Level Monitoring System for Distilleries (Excise Norms)
- ▶ Solutions for other processes:
 - ▶ Pressure - Pressure / Vacuum / Compound Gauge & Transmitters.
 - ▶ Level - Level Gauge & Switches, Level Transmitters Capacitance, Hydrostatic, Ultrasonic, Conductivity, Vibrating Fork & Radar.
 - ▶ Flow - Orifice/flow Nozzle Based Flow Meter, Mechanical Water Flow Meter, Magnetic, Vortex, Mass & Ultrasonic Flow Meters.
 - ▶ Analysers - Conductivity, Ph, Dissolved Oxygen Sensors & Transmitters, Oxygen & Other Gas Analysers.
 - ▶ Digital Instruments - Process Indicators / Controllers, Scanners, Data Loggers & Signal Isolators.
 - ▶ Instrumentation Hardware - Condensate Pot, Manifold & Isolation Valves, Syphon, Air Headers Snubber, Fittings Etc.
 - ▶ Solutions For Process Industries - Engineering, Integration From Field Devices To Process Controls.



Alpha Engineering & Systems

An ISO 9001:2015 Company

Factory : WH-70, 1st Floor Mayapuri Industrial Area, Phase-1 (Near Metal Forging Red Light), Mayapuri, New Delhi-110064

Office : A-2, 2nd Floor, Rajouri Graden, New Delhi-110027

Phone: 011-41009242, 41001288 | Email: sales@alphaengg.in | Website: www.alphaengg.in

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