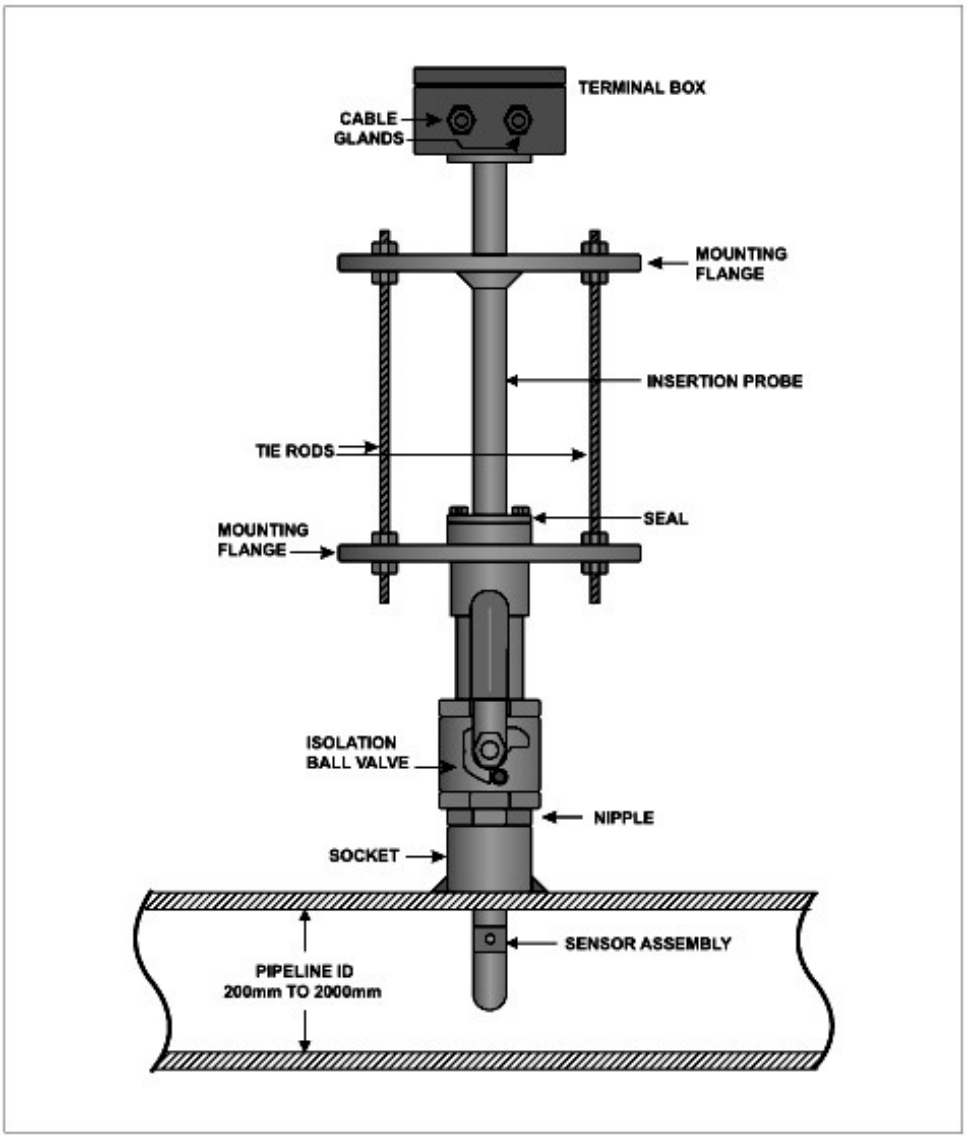
NEELKANTH INSTRUMENT & CONTROL

We are NEELKANTH INSTRUMANT & CONTROL & Solutions committed for design & development for customer satisfaction

A) Introduction

We are leading manufacture for Electromagnetic flow meter in process control instrumentation; Maintenance free low cost, highly stable reliable & ideal flow meter suitable for wide ranges of liquid flow measurements the flow meter with low pressure. The measurement being based on 'Faraday's law of electromagnetic induction' is independent of viscosity, density, pressure and temperature of the flowing media & measurement is a true volumetric flow measurement. Standard current output of 4 – 20 mA DC is provided which is directly proportional to the instantaneous volumetric flow rate.



1) Advantages and Disadvantages:

Advantages of Meter:

1. A magnetic flow meter provides an unobstructed flow path, with negligible pressure drop due to its pipe
2. The typical accuracy for a magnetic flow meter is + 0.5 % of full scale. This is among the best of the various pipe flow meters.
3. The effect of fluid viscosity on flow through a magnetic flow meter is essentially the same as for flow through the pipe itself.
4. The magnetic flow meter can be used for pipe flow measurement of either clean or dirty liquids, including wastewater, corrosive liquids, or slurries.

Disadvantages of Meter:

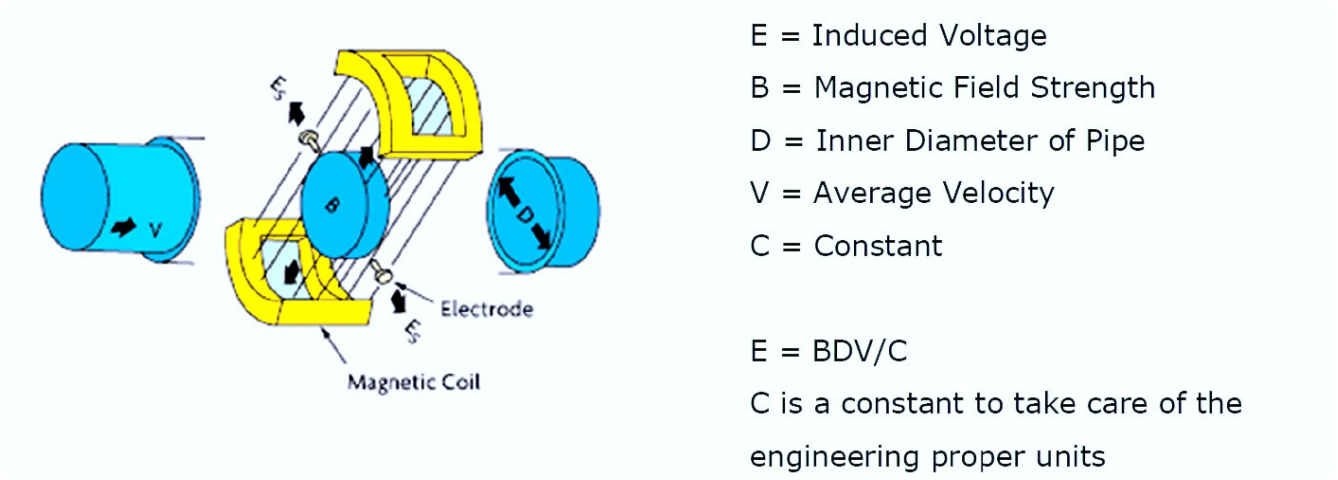
1. The magnetic flow meter is used primarily for liquids. It doesn't work well for measurement of gas flow rate.
2. In order to use a magnetic flow meter for measurement of a liquid's flow rate, that liquid must be conductive.

2) Applications:

Electromagnetic flow meter can be used for precise flow measurement of all electrically conductive liquids such as sledges, slurries, sewage, milk, water and waste water.

- Electromagnetic flow meter has many applications across many industries
- Chemical measurement, Water/waste water Treatment & metering
- Building Automation & plant automation
- Pulp, paper, Food & Beverage
- Advanced Metering Infrastructure
- American Water Works Association
- Automated meter reading
- Drinking water
- Electricity Meter
- Flow measurement
- Gas meter
- Meter Data Management
- Public utility
- Utility sub meter
- Water conservation

3) Operation Diagram:



B) Primary Flow Tube Specifications

1. Media Pressure - 20kg/cm², 25 kg/cm

2. Media Temperature - PTFE LINER, Hard Rubber LINER

3. Ambient Temp - 0 – 60 °C

5. Materials - Pipe – SS 304 [non magnetic & without paint]

Electrodes – SS 316/SS 316L/has alloy C

Inner lining – PTFE / Hard rubber

Coil Housing – CS (Polyurethane Painted)

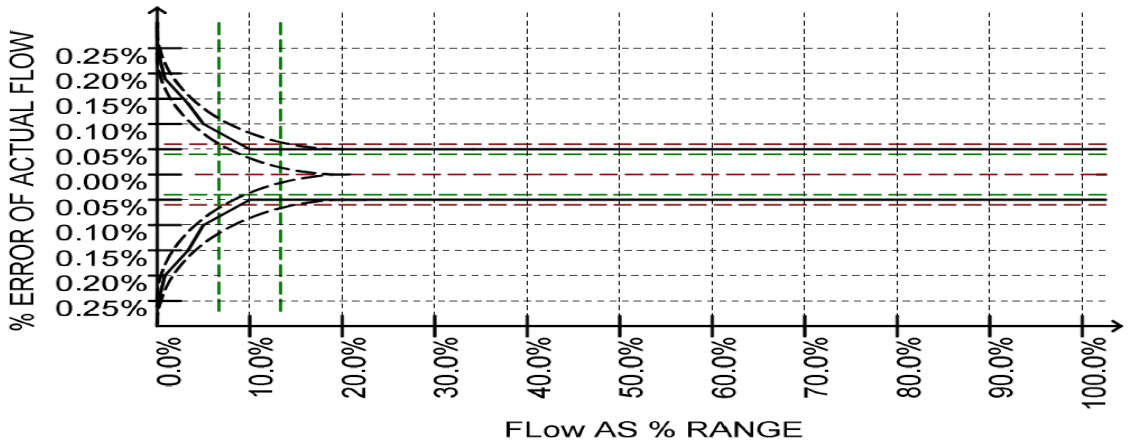
C) 4-20 mA Transmitter Specifications

1. Type - Integral / Remote Mounting

2. Enclosure - Aluminum Die-cast - for Amplifier / Transmitter

3. Dimensions	**- Head Mount:** 100 mm (L) x 160 mm (W) x 80 mm (D)
	- Remote Mount: 100 mm (L) x 160 mm (W) x 80 mm (D)
4. Cable Entries	**-** 3 nos. for remote / integral Transmitter
5. Cable Glands	**-** PG-7 [Standard]
6. Power Supply	**-** 110 V / 220 V AC 50 Hz S.P. ± 10 %
7. Temperature	**-** 0 – 50 °C (Operating Ambient)
8. Temp. Drift	**-** 0.010 % / °C
9. Humidity	**-** 90 % R.H. max. Non-condensing
10. Input	**-** Micro-volt signal proportional to flow rate from Flow Tube
11. Outputs	**-** 4 – 20 mA dc in max. 110 Ohms – Proportional (0 – 100 % flow rate)
12. Flow Range	**-** m³/hr, LPH, LPM & LPS
13. Totalize Range	**-** Lit & m³
13. Min. Media	**-** 5 µSiemens / cm (Conductivity)
14. Coil Excitation	**-** Pulsed DC
15. Local Display	**-** [a] 4 digit 7 Segment LED Display (with unit indications)
	[b] 8 Digit 7 Segment LED Display for Totalized quantity (with unit indication)
16. Flow Velocity	**-** a) 1.25m/s, b) 2.5m/s, c) 5.0m/s, d) 10.0m/s
	- a) V=0.3m/s, b) V=1m/s, c) V=12m/s
17. Accuracy	**-** ± 1% (10 % to 90 % of calibrated range in ref. conditions)
18. Ref. Conditions	**-** Power supply nominal ± 10% Temperature 27°C ± 2°C
19. Repeatability	**-** ± 0.2 % of reading
20. Ingress Protection	**-** IP – 65 Equivalent

D) Error Diagram



E) Flow Rate Table

Flow rates at velocity						
METER SIZE		**Flow Rates (in m3 / hr) at different velocities**				
Inch	DN	1.00 m/s	1.25 m/s	2.50 m/s	5.00 m/s	10.00 m/s
0.5	15	0.636	0.795	1.59	3.18	6.36
0.75	20	1.131	1.41375	2.8275	5.655	11.31
1	25	1.767	2.20875	4.4175	8.835	17.67
1.25	32	2.895	3.61875	7.2375	14.475	28.95
1.5	40	11.95	14.9375	29.875	59.75	119.5
2	50	7.068	8.835	17.67	35.34	70.68
2.5	65	11.95	14.9375	29.875	59.75	119.5
3	80	18.907	23.63375	47.2675	94.535	189.07
4	100	28.2	35.25	70.5	141	282
5	125	44.18	55.225	110.45	220.9	441.8
6	150	63.62	79.525	159.05	318.1	636.2
8	200	113.1	141.375	282.75	565.5	1131
10	250	176.7	220.875	441.75	883.5	1767
12	300	254.5	318.125	636.25	1272.5	2545
14	350	346.4	433	866	1732	3464
16	400	452.4	565.5	1131	2262	4524
20	500	706.9	883.625	1767.25	3534.5	7069
24	600	1018	1272.5	2545	5090	10180
28	700	1385	1731.25	3462.5	6925	13850
32	800	1810	2262.5	4525	9050	18100
36	900	2290	2862.5	5725	11450	22900

F) COMPARISION OF ULTRASONIC & ELECTROMAGNETIC FLOWMETER

PARAMETER	**ULTRASONIC (DOPPLER)**	**ULTRASONIC (TRANSIT TIME)**	**ELECTROMAGNETIC**
Min. Velocity of liquid	1.8 m/Sec	No min. limit	No min. limit
Effect of Density	Changes the calibration	Changes the calibration	No effect,
Un-dissolved solid contents in the liquid	Particle size > ג	not valid	Absolutely no effect
Vibration on pipe line	Shifts Zero	Not effect	Absolutely no effect
Calibration validity after installation	Not valid change in length	Not valid change in length	Completely valid
Scaling on pipe	Adds to errors proportional to pipe.	proportional to pipe	No effect
Partially filled Tube	No readings	No readings available & indicates '0'	indicates partial flow
Accuracy	about 2% to 5%	about 1% to 2%	0.5% to 1%
Service	Continuous attention required	Continuous attention required	Fit & forget

G) Installation & Commissioning

DOs and DONTs

1) Before connecting the mains supply to the amplifier first check its label for the specified mains supply. It may be 110 V AC or 230 V AC or 24 V DC. Apply specified mains supply.
2) Do not disturb any trim pot inside the amplifier / transmitter. This will disturb the calibration of the amplifier.
3) In case of remote amplifier / transmitter if flow indicated on the display is negative interchange the wires from Pin 9 and Pin 10 of TS2 connector inside the head mounted Terminal Box on Flow Tube.
4) Always ensure proper earthing to Primary flow tube (Measuring Earth), and also to amplifier / transmitter (Protection Earth). Earth resistance should be < 10 Ω.
5) In case of remote transmitter do not install the amplifier/ transmitter exposed to direct sunlight or at a place subjected to intense vibrations. Install the transmitter at a place where no vibrations are present.
6) While installing the Flow Meter Tube (Integral or Remote Transmitter) make sure that no vibrations are present at the location of installation.
7) In case of remote transmitter, while connecting the shielded cables do not ignore shield connections. The cables should be as far away as possible from any power cables or switch gear cables [min. distance between signal cables and power cables should be greater than 12 inches.]
8) Use proper snubber circuits across the coils of the switchgear assemblies near to the transmitter.
9) The earthing of the primary flow tube must be separate from normal electrical " earth grid " used in the plant.
10) The installation of the primary flow tube and transmitter should be as away as possible from heavy electrical loads.
11) Verify the polarity of the load connected across the output.
12) Ensure the load connected across the output terminals is within specifications.
13) If UPS output is used to drive the Flow Transmitter, ensure that the output of the UPS is Sinusoidal waveform and not square wave or quasi-square wave output.
14) If there are fluctuations in supply voltage use of CVT is recommended.
15) Ensure that the transmitter mounting screws and the lid screws for the transmitter and the head mounted terminal box on the flow tube (if remote transmitter) are always tightened properly to maintain the IP65 class protection.
16) Do not expose the amplifier / transmitter (Integral / Remote) to direct impact of sun and rain.
17) Ensure that no vibrations are present at the location of installation of Flow tube and transmitter.
18) Ensure that the cable glands are sealed (tightened) properly to maintain the IP65 Class protection.
19) Ensure that there are no leakages on the inlet side or outlet of the installed flow meter. Due to leakages on the inlet side of the Flow Tube air gets mixed with the fluid under measurement and causes measurement errors. The Electromagnetic Flow meter does not measure Bi-Phase flow.

H) Installation & Commissioning of Primary Flow Tube

The Primary Flow Tube can be installed at any point in the pipe run either horizontal or vertical provided the following conditions are satisfy as per figure 1.1 / 1.2 / 1.3 1.5 do not install flow meter as per Figure 1.4 / 1.6

1) The direction of flow through the pipe is the same as indicated on the primary flow tube by a red arrow.

2) Straight lengths of 5D on upstream and 3D on downstream measured from the Electrode axis is maintained.

3) If disturbances like cork screwing or vortex flow conditions are present straight lengths should be increased or flow straighteners should be used. Flaps, slide gates, valves etc should be arranged at a distance of at least 3D downstream of primary flow tube.

4) Ensure primary flow tube remains completely filled by the fluid under measurement even under no flow condition. This ensures trouble free and reliable operation of the Flow meter. Select a location on the pipe, which will always run full of liquid. For vertical installations the direction of flow against gravity ensures full pipe. Some of the recommended installations are as under -

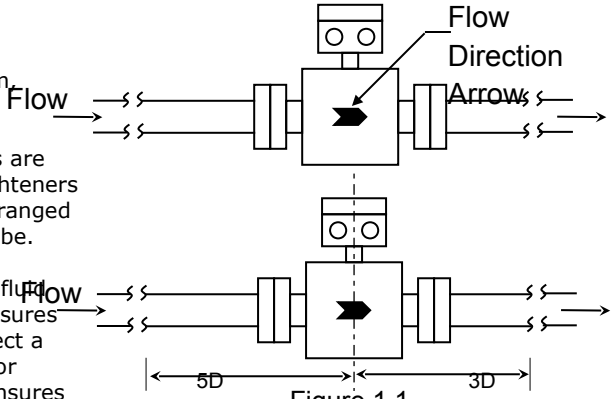


Figure 1.1

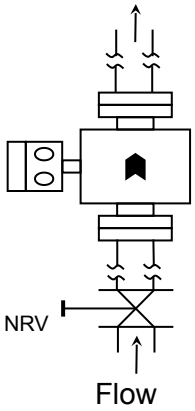


Figure 1.2

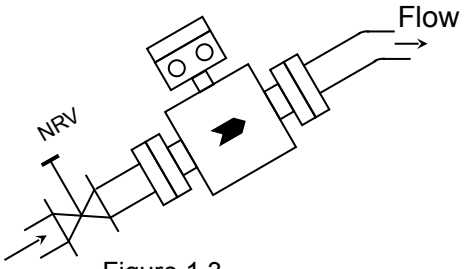


Figure 1.3

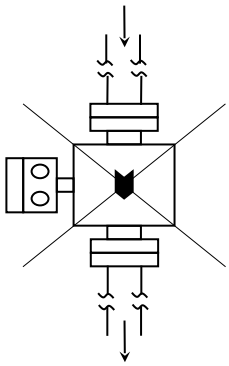


Figure 1.4

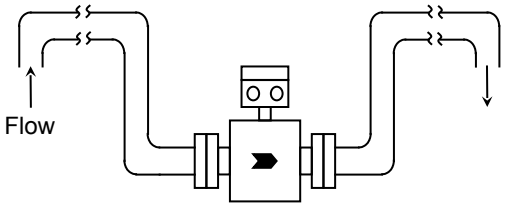


Figure 1.5

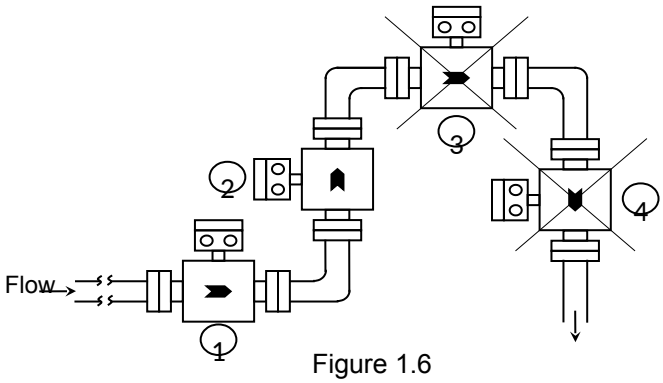


Figure 1.6

5) Open Feed or Open Discharge Provide sluice underpass if full pipe cannot be assured. This ensures full pipe under no flow condition.

6) As per figure 1.6 Locations 1 and 2 are recommended locations, Location 3 is the highest point in pipe run this location is not recommended since air bubbles collect in the metering tube which will lead to faulty measurements. Location 4 is also not recommended since at zero flow the line will get drained and hence will give false measurements.

7) In case of heavily contaminated fluids, the primary flow tube should be installed with a bypass pipeline and isolation valves so that it can be removed for cleaning without interrupting operation. Primary Flow tube for Draining and Cleaning Refer Figure 1.7 installation diagram

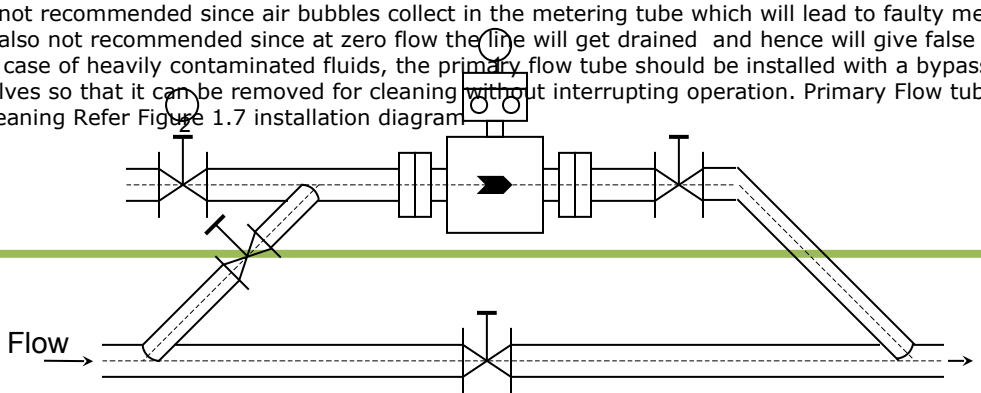


Figure 1.7

8) For Horizontal installations the electrode axis should always lie in horizontal plane to prevent contamination on electrodes and avoid loss of contact of electrodes with fluid because of gas bubbles.
9) Fit Air valve as shown if the down pipe is at a height greater than 5 meters to remove vacuum. Refer figure 1.8

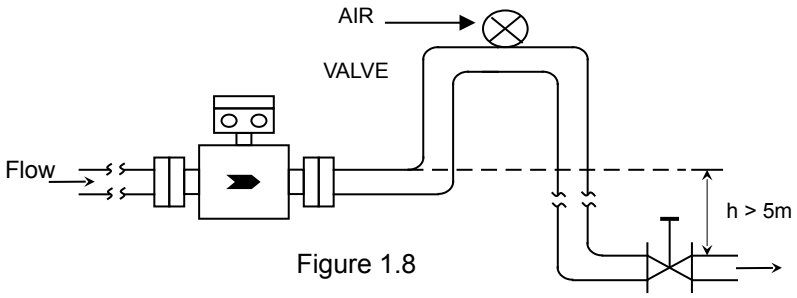


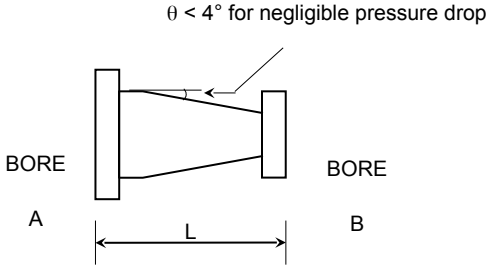
Figure 1.8

10) Strong Electromagnetic fields should not be located in the immediate vicinity of the flow tube since these could affect the field generated by the coils in flow tube and hence disturb the reading stability and accuracy. Ensure that no magnetic material other than the pipe and connecting flanges should come in contact with the flow tube.

11) Ensure that the minimum conductivity of the fluid under measurement is greater than 5 µseimens / cm is maintained. Ensure that the fluid under measurement does not contain magnetic particles in it otherwise it will lead to measurement errors.

12) Reducers should be flanged and generally shall reduce by one size nominal bore otherwise the pressure loss will be high. The table given below is a general guideline dimensions for reducers refer bellow table

Nominal Bore A (in mm)	Nominal Bore B (in mm)	Length L (in mm)
40	25	150
50	40	200
65	50	200
80	65	200
100	80	250
150	100	300
200	150	300
250	200	300
300	250	460
350	300	460
400	350	460



For more information on our products installation guide lines, please contact our channel partner or mail us on nicpune55@gmail.com