# UDM101
# MANUAL

Version V-01.00
Datum 10-03-2023

E

SOLUTIONS

# IHR PARTNER FÜR MESSTECHNISCHE SYSTEMLÖSUNGEN

eom-solutions GmbH
Energy Optimizing Monitoring

eom SOLUTIONS

# UDM101

Version V-01.00
Datum 10-03-2023

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# 1 NOTICE

This instruction manual is appropriate for UDM101 series ultrasonic flowmeter.

This ultrasonic flowmeter adopts ARM.FPGA chip and low-voltage wide-pulse sending technology.

This instruction manual contains important information. Please read carefully before the operation of the flowmeter,avoiding damaging flowmeter and improper use.

This instruction manual will introduce how to use the flowmeter step-by-step, including product component, installation, wiring, quick setup etc. to make it easier to operate.

Understanding more about the menu settings can fulfill your higher requirements with the flowmeters' powerful function option and output function.

WARNING

May cause injury.

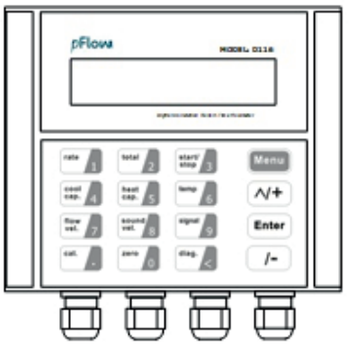
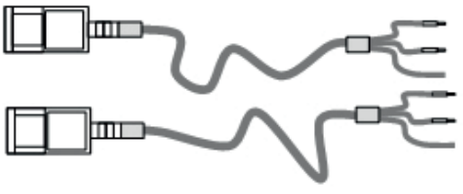
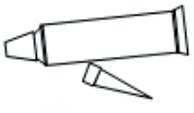
ATTENTION

May damage the flow meter.

Some of the instructions may be different to the flowmeters you purchased, depending on con - figuration requirements, otherwise, there is no indication about the product design and upgrade requirement in the instructions, please refer to the version number, as well as the appendix.

# 2 PRODUCT COMPONENTS

Inspection should be made before installing the Flowmeter. Check to see if the spare parts are in accordance with the packing list. Make sure that there is no damage to the enclosure due to a loose screw or loose wire, or other damage that may have occurred during transportation. Any questions, please contact your representative as soon as possible.

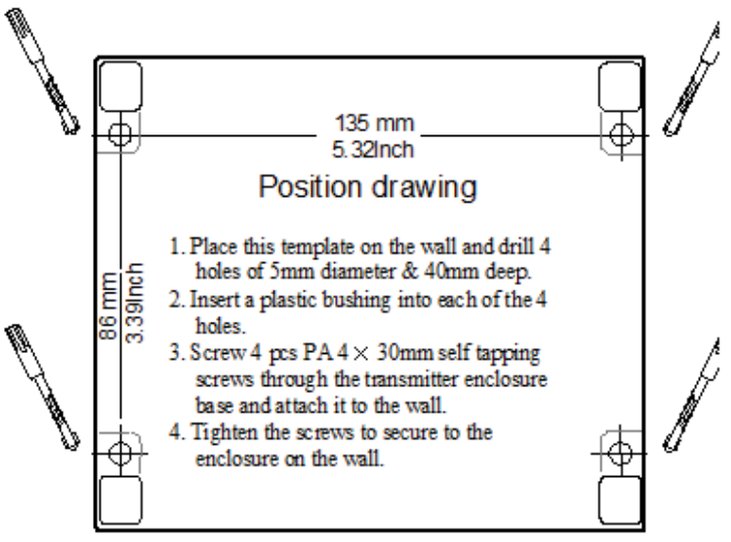
<table>
<tr><th>Transmitter</th><th>Transducers</th></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><th>Accessories</th><th>Documents</th></tr>
<tr><td>
Pipe Straps

Coupling compound

Install accessory</td><td>
1. Instruction Manual
2. Packing List
3. Position drawing</td></tr>
</table>

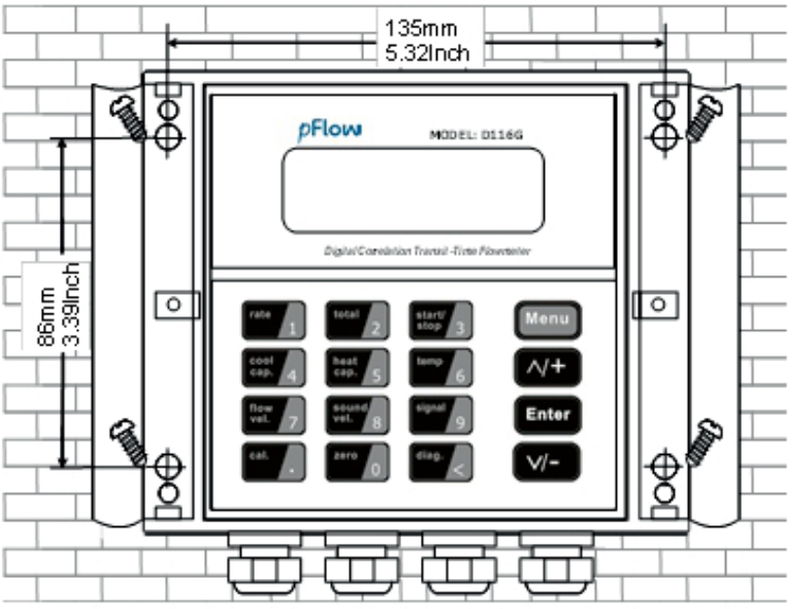
# 3 TRANSMITTER INSTALLATION

## 3.1 Inspection prior to Transmitter Installation

You will find a "Position Drawing" in the packing. Please use it as a template in the place that you are going to install the Flowmeter. Then drill 4 installing holes at the screws position shown on the drawing with the 5.0mm drill.




Take out the enclosed screws and plastic bushings. Insert the plastic bushings into the installing holes. Put the flowmeter to the position and screw it in.




### ATTENTION

When installing please ensure the front cover is secure and will not fall open.

## 3.2 Wire Connecting

### 3.2.1 Power supply option

Customers should pay special attention to specify the desired power supply when wiring.

Factory standard power supply is 10~36VDC/1A max.

To ensure the transmitter can work normally, please pay attention to the followings when wiring:

Ensure that power connections are made in accordance with the specifications shown on the transmitter.

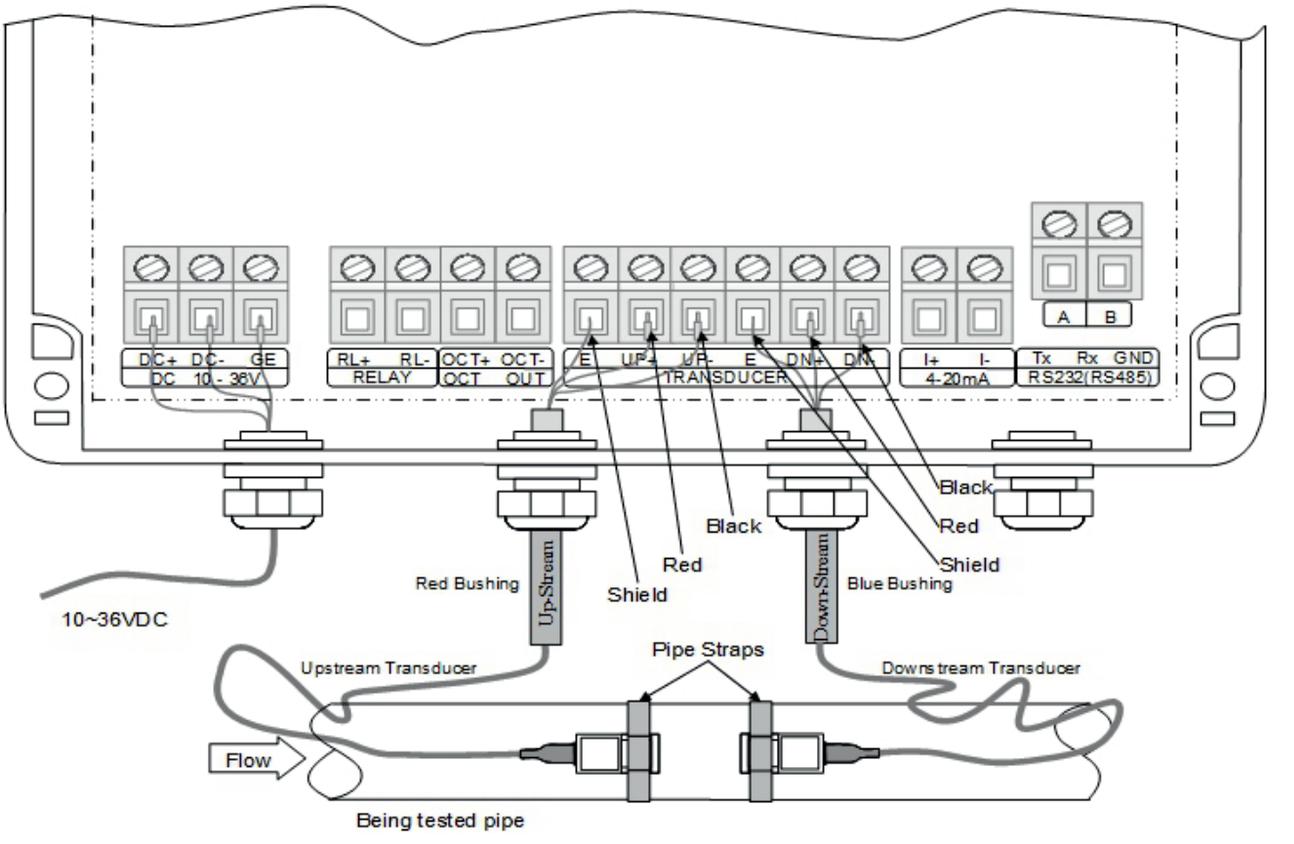
### 3.2.2 Transmitter Wiring

Once the electronics enclosure has been installed, the Flowmeter wiring can be connected.

Open the case, you will find the transmitter interfaces labels from left to right as follows:

Power supply, Relay output, OCT Output, Upstream transducer, Downstream transducer, 4-20mA, RS485 interface.

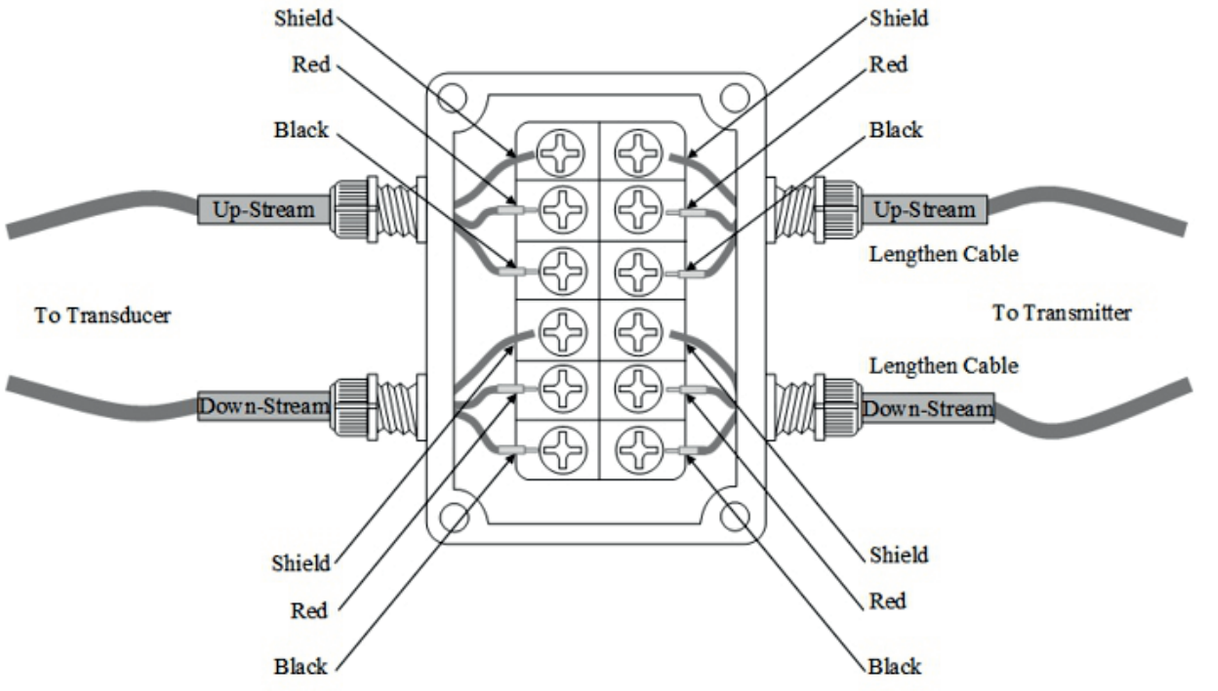
Refer to the below diagram for specific connection:



### 3.2.3 Lengthened Cable Method

Standard cable length of sensor is 9 meters; it can be lengthened to be 300 meters according to the actual need for fluid measurement.

### 3.2.4 Sketch of lengthened Cable




### 3.2.5 Junction Box Requirements

The flowmeter use sealed waterproof junction box, installing 6×2 press-connections, the recommended minimum specifications of the junction box is 115×90×55mm.

### 3.2.6 Cable Specifications

Name: Shielded Twisted Pair

Administer Standard: JB8734.5

Diameter: Φ5 mm

Twist Line Space: 50 mm

Multi Core Line: 0.4 $mm^2$/radix

Wire Guage: AWG 20#

Core Line Color: Red and Black

Shield Floor: 128 Intwine

**WARNING**

Wire with power off. The flow meter must be reliable grounding before installation.

## 3.3 Powering on

As soon as the Flowmeter is switched on, the self-diagnosis program will start to run. If any error is detected, an error code will display on the screen (Refer - Error Diagnoses). After that self-diagnosis, the system will run automatically according to the last input parameters.

If the installation is accomplished when system is switched on, gain adjustment can be monitored in Window M01. After S1, S2, S3, S4 are displayed on the upper left corner of the screen, the system will activate the normal measurement condition automatically. It is indicated by code "*R" on the upper left corner of the screen.

If it is the first time to use or install on a new site, the customer need to input the new installation site parameters. The system will default to the last window settings and automatically display them at next power on.

## 3.4 Keypad Functions

This keypad is dual function keypad:

1. When separately pressed, is shortcut function, referring to "2. Quickly set menu instructions ";

2. Press Menu and Number key, is Menu key, referring to"6.Menu Window Description".

Follow these guidelines when using the Flowmeter keypad (Refer to Keypad Figure)0 ~ 9 And ¡ñ To input numbers.< Backspace or delete characters to the left.And ^ Return to the last menu or to open the next menu. Acts as "+" and "-" functions when entering numbers.

Menu Select a menu. Press this key first, input two menu numbers and then enter the selected menu. For example, to input a pipe outside diameter, press 1 keys, where "11" is the window ID to display the parameter for pipe outside diameter.

## 3.5 Keypad Operation

The flow meter adopts the window software design to consolidate or subdivide all of the parameters entered, the instrument setup and measurement result displays into more than 100 independent windows. The operator can input parameters, modify settings or display measurement results by "visiting" a specific window. These windows are arranged by 2-digit serial numbers (including "+" sign) from 00~99, then to +0, +1, etc. Each window serial number, or so-called window ID code, has a defined meaning. For example, Window M11 indicates the parameter input for pipe outside diameter, while Window M25 indicates the mounting spacing between the transducers, etc. (Refer – Windows Display Explanations).

The keypad shortcut to visit a specific window is to press the Menu key at any time, then input the 2-digit window ID code. For example, to input or check the pipe outside diameter, just press the 1 keys for window ID code 11.

Another method to visit a particular window is to press ˆ and ˆ keys to scroll the screen. For example, if the current window ID code is M02, press  key to enter Window M01, press the  button again to enter Window M00; then, press the  key to back Window M01, and press the  key again to enter Window M02.

Windows are separated into three types: (1) Data Type, such as M11, M12; (2) Option Type, such as M14; (3) Pure Display Type, such as M01, M00.

You can check the corresponding parameters by visiting the Data Type Windows. If you want to modify the parameters, input the digits and press Enter or press  first, input the digits then press  again to confirm.

Example1: To enter a pipe outside diameter of 219.234, the procedure is as follows:

Press  keys to enter Window M11 (the numerical value displayed currently is a previous value). Now press  key. The symbol ">" and the flashing cursor are displayed at the left end of the second line on the Screen. Then input the parameters; or do not press thekey, directly enter .You can check the selected option by visiting Option Type Windows. If you want to modify it, you must press  first, the symbol ">" and the flashing cursor are displayed at the left of the Screen. Operator can use the  and  to scroll the screen and get the required value then press  to confirm; or enter the corresponding value option directly and press  to confirm.

For example, if the pipe material is "Stainless Steel", Press  to enter Window M14, press  to modify the options. Select the "1. Stainless Steel" option by pressing  and , then press  to confirm the selection; It is possible to press  key to change the selection and wait until  "1.Stainless Steel" is displayed on the second line of the screen, then press  to confirm.

ATTENTION

Generally, press Enter key first if operator wants to enter "modify" status. If the modify" is still not possible even after pressing the  key, it means that system is locked by a password. To "Unlock" it, select "Unlock" in Window M47 and enter the original password.

## 3.6 Flowmeter Window Descriptions

These windows are assigned as follows:

01~08 Flow Totalizer Display: to display flow rate, positive total, negative total, net total, velocity, date & time, present operation and flow results today, etc.

10~29 Initial Parameter Setup: to enter pipe outside diameter, pipe wall thickness, fluid type, transducer type, transducer mounting method and spacing, etc.

30~38 Flow Units Options: to select the flow unit such as cubic meter, liter or other units, can turn totalizers on/off and reset totalizers, etc.

40~49 Setup options: Scaling factor, system lock (Window M47), etc.

55~89 Input and output setup: date and time, ESN, communication baud rate setting, etc.

90~98 Diagnoses: Signal strength and signal quality (Window M90), TOM/TOS*100 (Window M91), flow sound velocity (Window M92), total time and delta time (Window M93), Reynolds number and factor (Window M94), etc.

+0~+5 Appendix: power on/off time, total working hours, on/off times and a single-accuracy function calculator.

# 4 PIPE PARAMETER ENTRY SHORTCUTS

## 4.1 Dual function keys menu description

Press [1] key

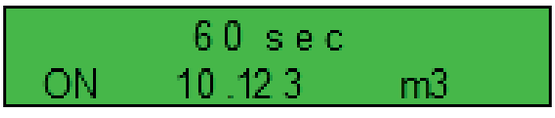
Display Net Flow Today /Flow Max /Flow Min/The Averag /Current Rate in turn.

Press [2] key

Display Day Totalizer Flow /Monthly Totalizer Flow / Yearly Totalizer Flow in turn.

Press [3] key

Display Totalizer Start and Stop in turn.

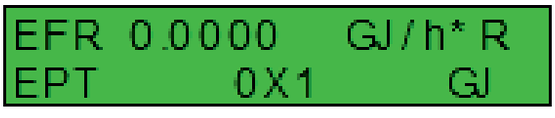



Press [4] key

Display instantaneous cool capacity and cool capacity totalizer.

Press [5] key

Display instantaneous heat capacity and heat capacity totalizer.

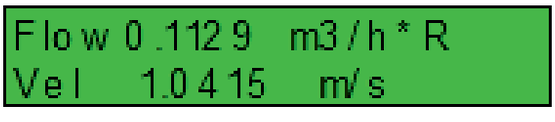



Press [6] key

Display the temp in, out and temperature difference.

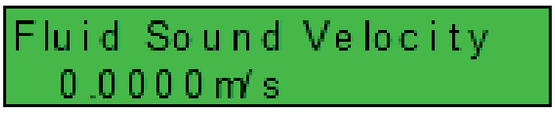
Press [7] key

Display Flow Rate and Velocity.



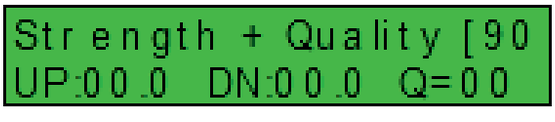

Press [8] key

Display Flow Sound Velocity.



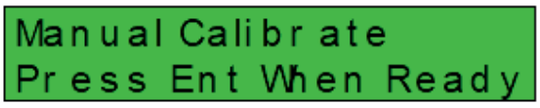

Press [9] key

Display Signal Strength and Signal Quality.



Press [.] key

Press Ent to start Manual Totalizer, then press Ent to end Manual Totalizer, press Ent to input Standard Totalizer to get the final K factor. Complete the calibration with pressing Ent to store.

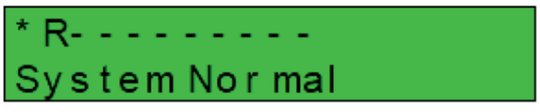



Press [0] key

Input Code 1234 to complete Reset Zero.

Press [<] key

Display System Error Codes.




## 4.2 Examples

For example, measuring the diameter of 219mm and pipe wall thickness of 6mm, measuring medium is water, Pipe Material is carbon steel, No Liner, can be operated as follows:

Step1. Pipe outside diameter:

Press keys to enter Window M11, and enter the pipe outside diameter, and then press the key to confirm.

Step2. Pipe wall thickness

Press the key to enter Window M12, and enter the pipe wall thickness, and press the key to confirm.

Step3. Pipe Material

Press the keys to enter Window M14, press the key, press the or key to select Pipe Material, and press the key to confirm.

Step4. Transducer type

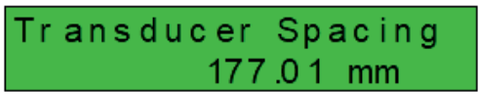
(The transmitter is available for various transducer types.)

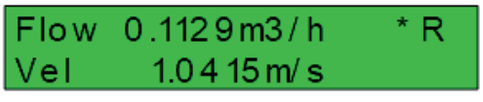
Press the key to enter Window M23,press the key,move the or key to select transducer type,and press the key to confirm.

Step5. Transducer mounting methods

Press the [Menu] [2] [4] key to enter Window M24, press the Enter key, press the ^ or ^ key to select transducer-mounting method, and press the  key to confirm.

Step6. Adjust Transducer spacing Press the [Menu] [2] [5] key to enter Window M25, accurately install the transducer according to the displayed transducer mounting spacing and the selected mounting method (Refer to Installing the Transducers in this chapter).




Step7. Display measurement result

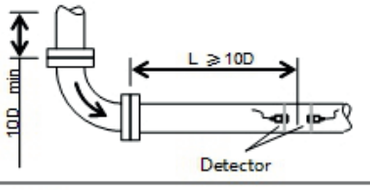
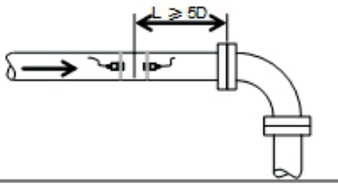
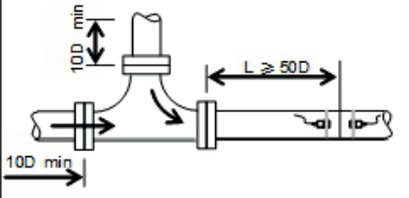
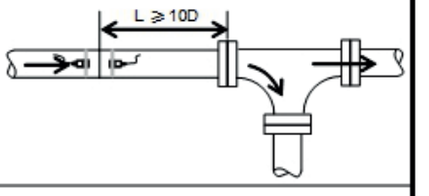
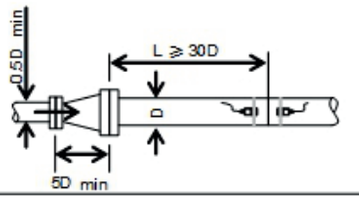
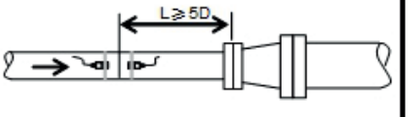
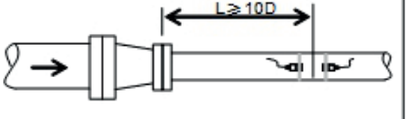
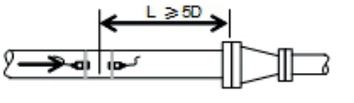
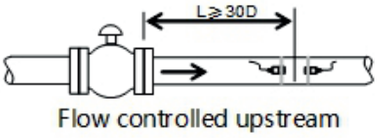
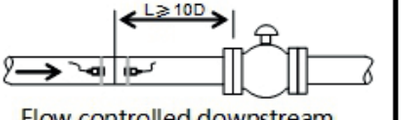
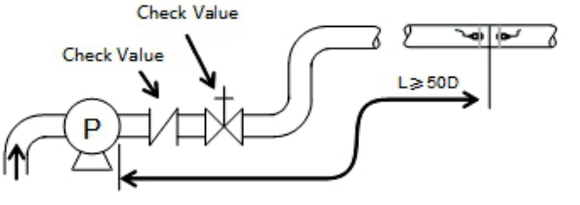
Press the [Menu] [0] [1] keys to enter Window M01 to display measurement result. (Base on the actual measurement)

# 5 MEASUREMENT SITE SELECTION

When selecting a measurement site, it is important to select an area where the fluid flow profile is fully developed to guarantee a highly accurate measurement. Use the following guidelines to select a proper installation site:

Choose a section of pipe that is always full of liquid, such as a vertical pipe with flow in the upward direction or a full horizontal pipe.

Ensure enough straight pipe length at least equal to the figure shown below for the upstream and downstream transducers installation.

| Name | Straight length of Upstream piping | Straight length of Downstream piping |
|---|---|---|
| 90°bend |  |  |
| Tee |  |  |
| Diffuser |  |  |
| Reducer |  |  |
| Value |  Flow controlled upstream |  Flow controlled downstream |
| Pump |  | |

Ensure that the pipe surface temperature at the measuring point is within the transducer temperature limits.

Consider the inside condition of the pipe carefully. If possible, select a section of pipe where the inside is free of excessive corrosion or scaling.

# 6 TRANSDUCER INSTALLATION

## 6.1 Installing the transducers

Before installing the transducers, clean the pipe surface where the transducers are to be mounted. Remove any rust, scale or loose paint and make a smooth surface. Choose a section of sound conducting pipe for installing the transducers. Apply a wide band of sonic coupling compound down the center of the face of each transducer as well as on the pipe surface, ensure there are no air bubbles between the transducers and the pipe wall, and then attach the transducers to the pipe with the straps provided and tighten them securely.

Note:

The two transducers should be mounted at the pipe's centerline on horizontal pipes.

Make sure that the transducer mounting direction is parallel with the flow.

During the installation, there should be no air bubbles or particles between the transducer and the pipe wall. On horizontal pipes, the transducers should be mounted in the 3 o'clock and 9 o'clock positions of the pipe section in order to avoid any air bubbles inside the top portion of the pipe. (Refer to Transducer Mounting). If the transducers cannot be mounted horizontally symmetrically due to limitation of the local installation conditions, it may be necessary to mount the transducers at a location where there is a guaranteed full pipe condition (the pipe is always full of liquid).

### 6.1.1 Transducer Spacing

After entering the required parameters, the spacing between the ENDS of the two transducers is considered as the standard transducer spacing (Refer to Top View on transducer mounting methods). Check the data displayed in Window M25 and space the transducers accordingly.

### 6.1.2 Transducer Mounting Methods

Three transducer mounting methods are available. They are respectively: V method, Z method and N method. The V method is primarily used on small diameter pipes (DN100~300mm, 4 s ~12). The Z method is used in applications where the V method cannot work due to poor signal or no signal detected. In addition, the Z method generally works better on larger diameter pipes (over DN300mm, 12) or cast iron pipes.

The N method is an uncommonly used method. It is used on smaller diameter pipes (below DN50mm, 2).

### 6.1.3 V Method

The V method is considered as the standard method. It usually gives a more accurate reading and is used on pipe diameters ranging from 25mm to 400mm (1 ¾~16 s ) approximately. Also, it is convenient to use, but still requires proper installation of the transducers, contact on the pipe at the pipe's centerline and equal spacing on either side of the centerline.