AUTROL® AMERICA AUTOMATION CONTROL

ALT 6400

Float Type Level Transmitter

LEVEL

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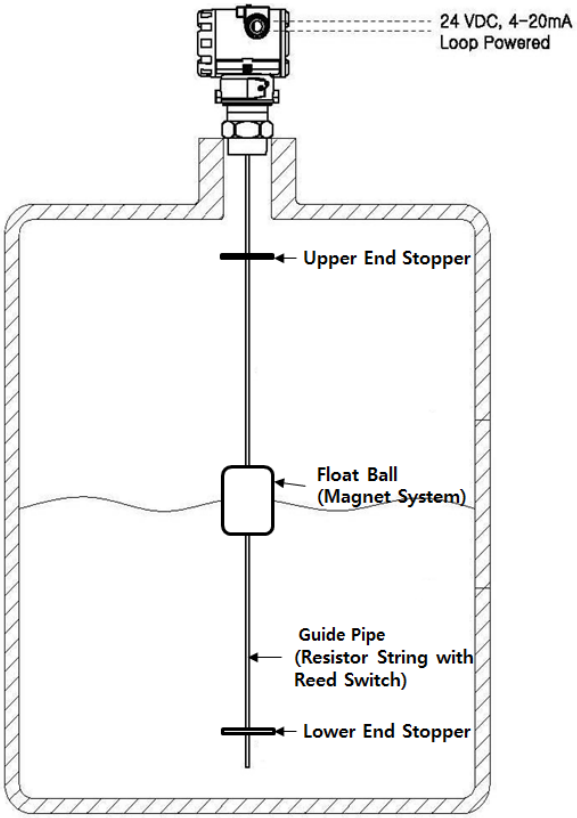
Overview

The Autrol ALT6400 Float Type Level Transmitter is a microprocessor based transmitter that uses buoyancy to control the water level inside the tank It is a transmitter that measures, and includes indicator, high level and low level alarm switching function.

Float ball floating magnet floating by buoyant control the Reed Switch inside the guide pipe to change the resistance value and receive this resistance value and output 4 ~ 20mA analogue value so that it can be used by control system like DCS or PLC As shown in FIG.

Basic Configuration



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Autrol Corporation Of America

ALT6400 Smart Float Type Level Transmitter

Features

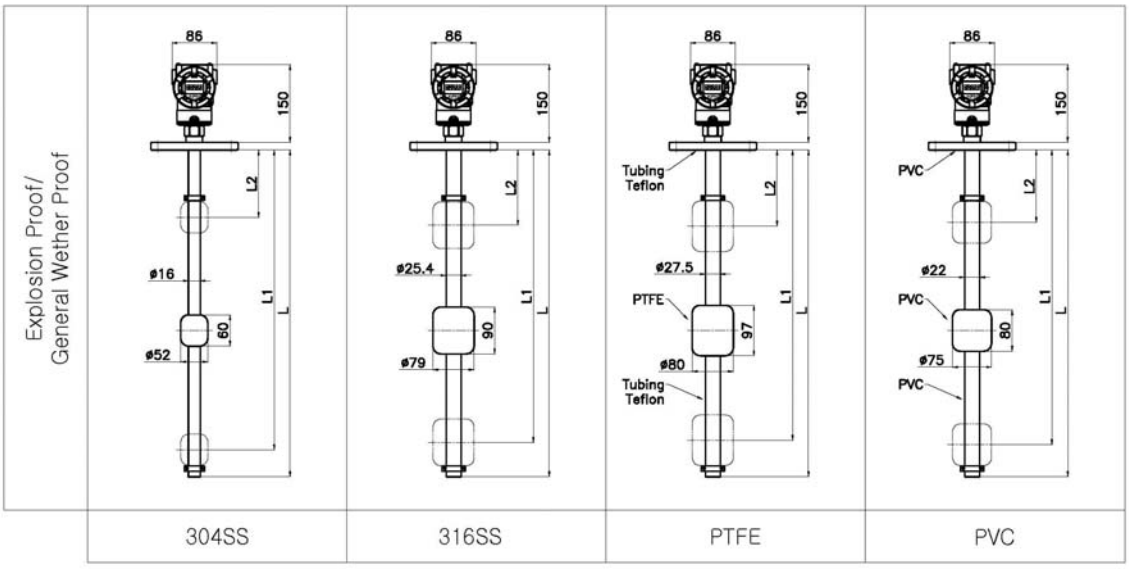
- Continuous level display possible
- 20mA current output and indicator display
- Easy on-site calibration and maintenance with a single instrument
- It is robust and very reliable.
- Continuous self-diagnosis
- Optional 2 Alarm port output(NPN open collector)

Applications

- Clean water without relatively floating
- Diesel or diluted corrosive liquid
- Used in high temperature and pressure tanks

Specification

Resolution	±10mm	
Output	Type	Analog 4 to 20mA (2wire) with HART digital signal
	Diagnostic Alarm	Adjustable 3.78, 21.1mA
Power	12.5~45VDC (with Hart digital signal) 18~45VDC @ 250 Ω	
Operation temperature	-40 to + 80 ℃ (LCD temperature limits: -20 to + 80 ℃)	
Process temperature	-20 to 150 ℃ (PVC material: -10 to 60 ℃)	
Process Pressure	20kg/㎠ .Max (PVC material: 0.5kg/㎠ .Max)	
Humidity Limits	5% ~ 100% RH	
Response Time	< 1second	
Zero/Span	Reed Switch	
Measurement Sensor Range	30KΩ[15M)@Sensor 10Ω Min. : 200Ω[100mm] / Max. : 50KΩ[25M)@Sensor 20Ω	



ALT 6400 Ordering Information

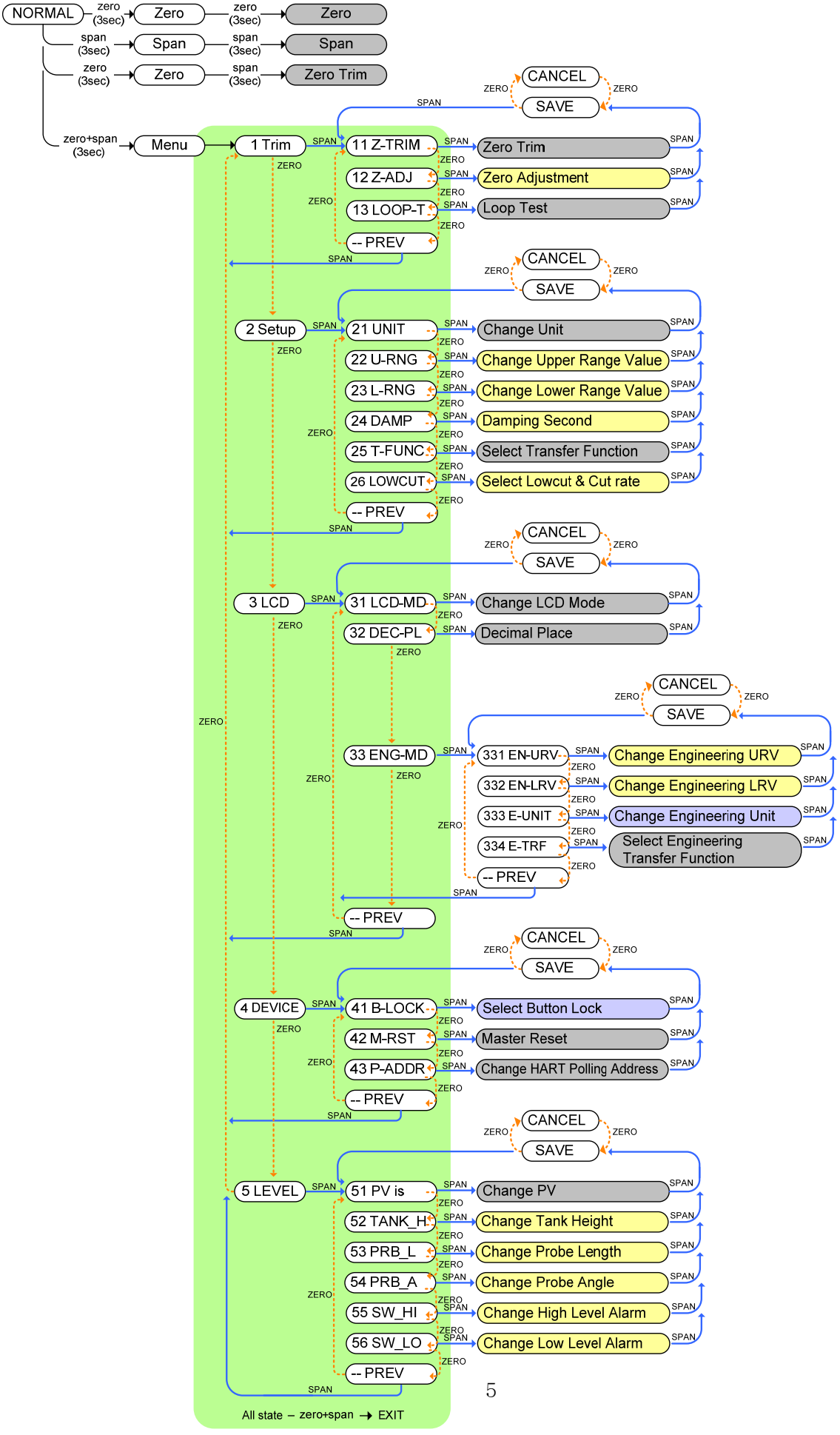
Model	Description
ALT6400	Smart Float Type Level Transmitter
Code	**Measurement**
-L	Level
-X	Special (manufacture order)*
Code	**Process Connection Size**
A21	2” ANSI, #150
A23	2” ANSI, #300
A26	2” ANSI, #600
A31	3” ANSI, #150
A33	3” ANSI, #300
A36	3” ANSI, #600
A41	4” ANSI, #150
A43	4” ANSI, #300
A46	4” ANSI, #600
J51	JIS 50A, 10K
J52	JIS 50A, 20K
J81	JIS 80A, 10K
J82	JIS 80A, 20K
J10	JIS 100A, 10K
J11	JIS 100A, 20K
S	Special*
Code	**Process Connection Material / Type**
S1	304SS / RF
S2	304SS(6t) / FF
S3	316SS / RF
S4	316SS(6t) / FF
PV	304SS with PVC / FF *
T1	304SS with PTFE / FF *
T2	304SS with PTFE / RF *
T3	316SS with PTFE / FF *
T4	316SS with PTFE / RF *
Code	**Sensor Pipe Material / Max. Process Temperature**
A	304SS / 80℃
B	304SS / 150℃
C	316SS / 80℃
D	316SS / 150℃

E	**304SS with PVC / 60℃**
F	**316SS with PVC / 60℃**
G	**304SS with PTFE / 80℃**
H	**316SS with PTFE / 80℃**
I	**304SS with PTFE / 150℃**
J	**316SS with PTFE / 150℃**
Code	**Output Signal**
A0	**4-20mA, HART**
A1	**4-20mA, HART, HIGH-LOW ALARM(NPN Open Collector)**
Code	**Electrical Connection**
1	**1/2-14NPT**
2	**G1/2**
X	**Special**
Code	**Hazardous Location Certifications**
K0	**Maker Standard (Waterproof:IP66)***
Code	**Option**
ST	**Stainless Steel Housing**
M1	**LCD Indicator(5digit)**
LPE	**Lightening Protector (External)**
LPI	**Lightening Protector (Internal)**
Code	**Sensor Pipe Length (500~5,800mm)**
- □□□…□ (with unit)	**Probe Length (meter/ft/mm/inch…)**

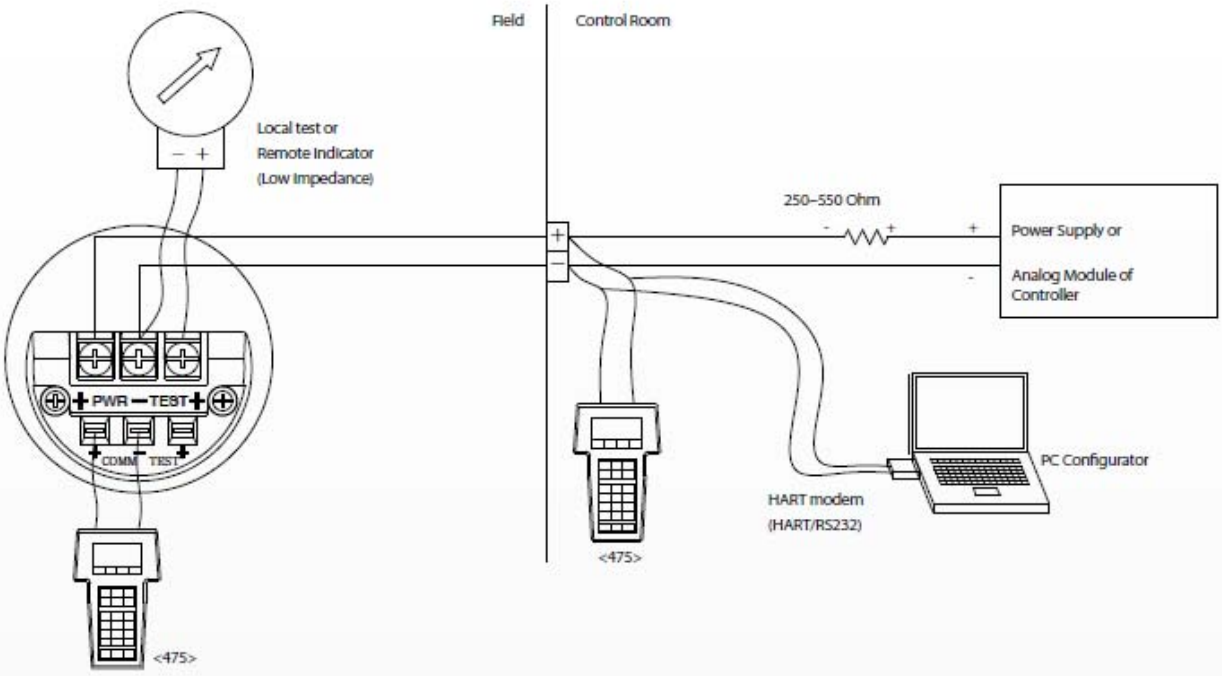
*** : ask before order**

Example : ALT6400-LJ81S2AA11K0M1-1000mm

SUS304SS, JIS 80A, 10K 6t FF FLANGE, 304SS Sensor Pipe 80℃ 4-20mA, HART,
HIGH-LOW ALARM(NPN Open Collector),
1/2-14NPT Epoxy-Polyester, Maker Standard(Waterproof:IP:66),
LCD indicator(5digit), 0~1M


NORMAL
zero (3sec)
Zero
zero (3sec)
Zero
span (3sec)
Span
span (3sec)
Span
zero (3sec)
Zero
span (3sec)
Zero Trim
zero+span (3sec)
Menu
1 Trim
11 Z-TRIM
Zero Trim
12 Z-ADJ
Zero Adjustment
13 LOOP-T
Loop Test
-- PREV
CANCEL
SAVE
2 Setup
21 UNIT
Change Unit
22 U-RNG
Change Upper Range Value
23 L-RNG
Change Lower Range Value
24 DAMP
Damping Second
25 T-FUNC
Select Transfer Function
26 LOWCUT
Select Lowcut & Cut rate
3 LCD
31 LCD-MD
Change LCD Mode
32 DEC-PL
Decimal Place
33 ENG-MD
331 EN-URV
Change Engineering URV
332 EN-LRV
Change Engineering LRV
333 E-UNIT
Change Engineering Unit
334 E-TRF
Select Engineering Transfer Function
4 DEVICE
41 B-LOCK
Select Button Lock
42 M-RST
Master Reset
43 P-ADDR
Change HART Polling Address
5 LEVEL
51 PV is
Change PV
52 TANK_H
Change Tank Height
53 PRB_L
Change Probe Length
54 PRB_A
Change Probe Angle
55 SW_HI
Change High Level Alarm
56 SW_LO
Change Low Level Alarm
SPAN
ZERO
All state – zero+span → EXIT

Connection Diagram of Signal, Power, HHT for Transmitter

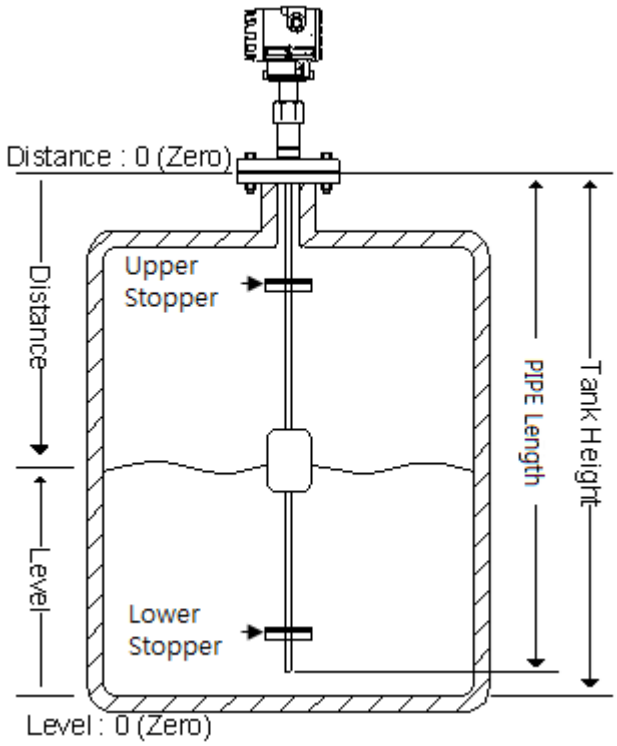


1. 475(HART Communicator) or PC Configurator may connected at any termination point in the signal loop.
2. HART Communication requires a loop resistance between 250 and 550 ohm @ 24 Vdc
3. Power Supply
   - Voltage Range : 12.5 to 45 Vdc
   - Voltage Rating : 24 Vdc ±30%

Common function

Parameters for level measurement

To measure the level, the parameters for the tank structure should be set as shown below.



Distance

Distance from the transmitter to the surface of the measuring medium (measurement result). Increase in the direction of guide pipe with zero (0) at the point where the transmitter and guide pipe meet. The transmitter converts the distance into the Level value after measuring the distance first. However, not all measurements measure the range exceeding the stopper.

Level

Distance from the bottom surface to the surface of the measuring medium (measurement result). It is a measure that can measure the amount of the medium stored in the tank by increasing the bottom surface to zero (0). As with Distance, it can not measure the range exceeding the Stopper.

Tank Height

Set the height of the tank. It is the distance from the tank bottom to the transmitter installation position, and it is a parameter that must be set for the level measurement. Exactly, "Level is 0 (Zero)From the desired point to be measured "to the transmitter mounting position. In general, if you want to set the level of the tank bottom to 0 (Zero), but you want to consider the level at a location other than the bottom as zero (Zero), adjust the value of Tank Height You can make the desired settings. See the "Level Setting Example" below for a detailed explanation. Tank Height must be greater than Upper Range Valu

The relationship between level and distance is as follows.

Level = Tank Height - Distance

Level Adjustment

Change the Tank Height to adjust the level to the entered value. That is, Tank Height = Input Value + Distance

Probe Length

Set the length of the guide pipe. This should be set to the length from the Distance (Zero) to the Lower Stopper. This setting is preset at the factory, so it should be changed only when adjusting the length of guide pipe or lower stopper or changing the pipe tube fixing method. Probe Length does not participate in level calculation, but is used only for error checking.

Probe Angle

It is recommended that the guide pipe be installed parallel to the tank wall. However, if the guide pipe is installed at an angle, the angle of the tilt can be compensated by adjusting the probe angle value. The Probe Angle is set to 0 degree when installed

Analog Output

4 ~ 20mA Analog Output converts the Primary Value to the current value corresponding to Range and outputs it. Primary Value can be selected as Distance or Level.

Primary Value is equal to LRV, it is 4mA. When it is equal to URV, 20mA is output.

Output unit setting

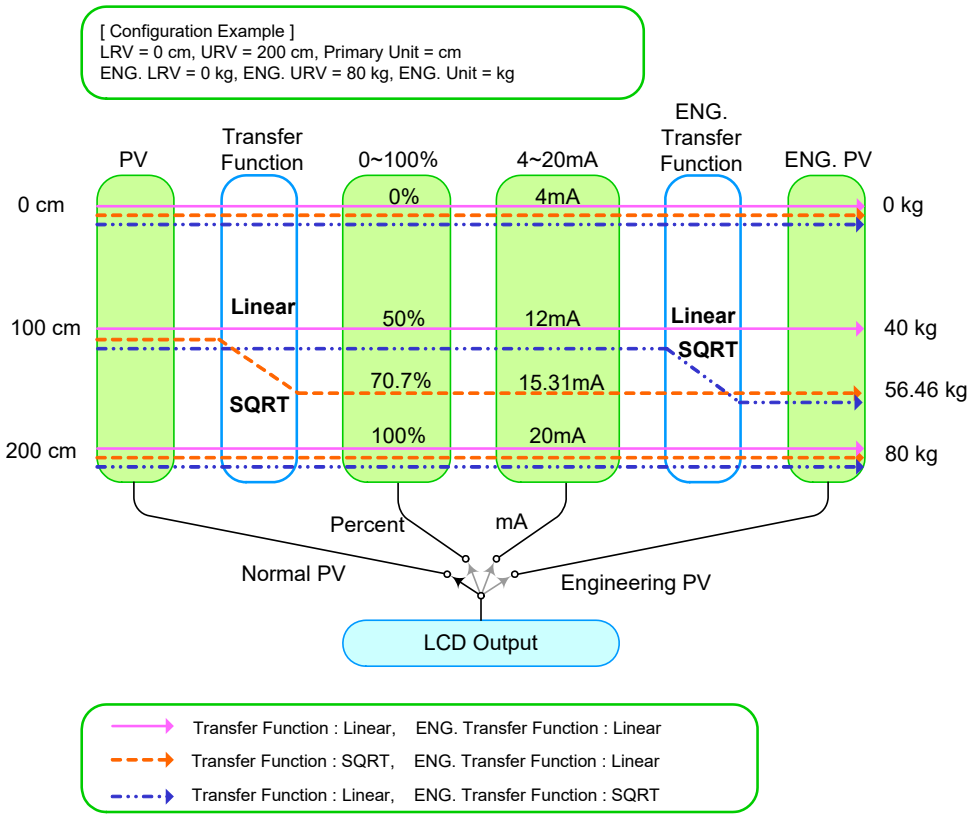
The measured primary value can be set to the desired unit for display by LCD and HART. Available units are as follows.

Available units	feet, meter, inch, cm, mm

The transmitter of the AUTROL series provides additional units for use in the LCD Engineering Mode. However, since the LCD Engineering Mode is a method of setting the display method on the LCD screen, the units added by the LCD Engineering Mode are used only for the LCD display and the HART uses the existing units.

LCD Engineering Mode

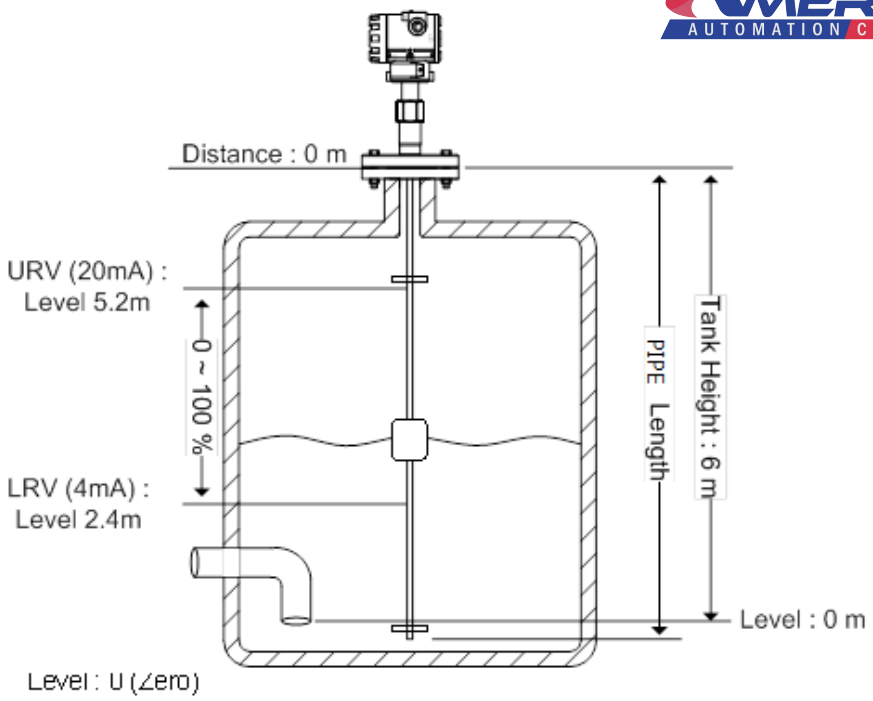
The ALT-6400 can output the measured results to the LCD screen in various ways. LCD Engineering Mode is a function that converts measured results into "numerical values with different weights" and outputs them to the LCD screen. In LCD Engineering Mode, Engineering Range is set separately and the measured result (0 ~ 100%) is mapped to Engineering Range and displayed on LCD. Refer to [Fig. 1-2] for the measurement value processing procedure in LCD Engineering Mode. Transfer Function and ENG. Note that the Transfer Function can not be set to SQRT at the same time.



[Fig. 1-2] Measurement value processing procedure

Level setting example

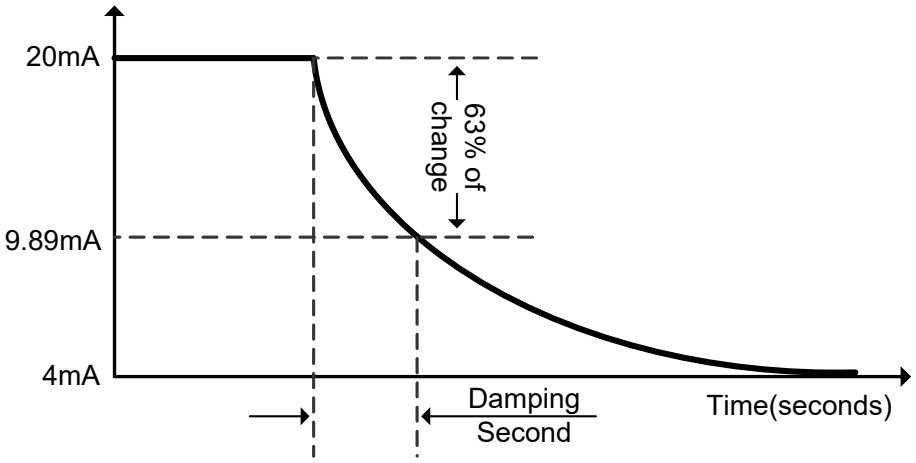
I would like to install the transmitter in a tank with the structure shown in [Figure 1-3]. The lower end of the tank has a suction line for the pump, and the suction line end point is at 0 m. Tank Height is set to the distance from the end point of the suction pipe to the transmitter, and LRV (Lower Range Value) was set at 2.4 m above the end point of the suction pipe. Similarly, the URV (Upper Range Value) corresponding to 20 mA was set at 5.2 m above the end point of the suction pipe, and the measurement span was 2.8 m, which is 5.2-2.4.



[Figure 1-3] Example of level setting

Damping Time Setting

Damping is a function that relaxes and outputs the sudden change (shock) of the input without reflecting it directly to the output. In addition, the periodic noise and vibration components included in the measurement And filtering. Damping Second is defined as the time it takes for the output to reach 63% of the change in instantaneous input change. Damping Second shall be established by reviewing the system's required response time, signal stability, and other requirements.



[Drawing 1-4] Damping Second

Damping Second can be set to a value between 0 and 60 seconds, and it is set to 1 second when shipped from the factory. The set value (Second) should be regarded as a "coefficient indicating the degree of damping". In practice, the definition itself is defined as "time to reach 63%", but it should be understood as "degree of relaxation" rather than "time" in actual use. In particular, if Damping Second is set to 1 second, do not perform an operation such as updating the output once every second.

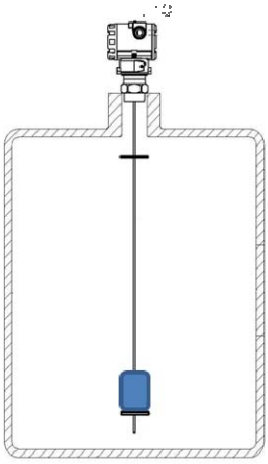
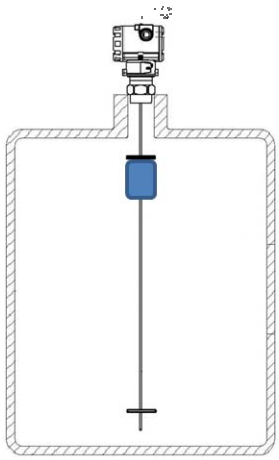
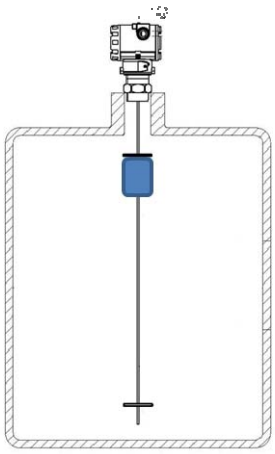
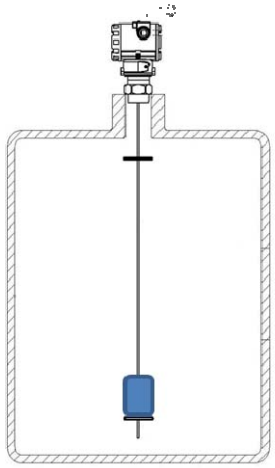
Item	Setting history	HART	button	Affected output items when changing settings
Basic setting	Change Range	O	O	All outputs except PV displayed on LCD
	Unit change	O	O	Unit change
	Damping Second change	O	O	Change Damping Second
	Transfer Function change	O	O	Change Transfer Function
	Low-cut change	O	O	All outputs except PV displayed on LCD
	Loop Test	O	O	All outputs except PV displayed on LCD
	PV is changed	O	O	All outputs
	Change Tank Height	O	O	If Level, Output All
	Change Probe Length	O	O	In some cases,
	Probe Angle change	O	O	Change Probe Angle
	Change High and Low Alarm values	O	O	Change alarm output
correction	Zero Trim	O	O	All outputs
	Zero Adjustment	O	O	All outputs
	Full Trim	O	X	All outputs
	D/A Trim	O	X	4~20mA
telautograph Information setting	Change Polling Address	O	O	4~20mA
	Set transmitter default information. (Tag, Date, Descriptor, Message, etc.)	O	X	-
LCD display	Change LCD mode	O	O	LCD display all
	Change Decimal Place	O	O	LCD display all
	Change LCD Engineering Mode	O	O	LCD Engineering Value

	(Eng Range, Eng Unit, Eng Transfer Function, etc.)			
Other	Button Lock setting	△	O	
	Master Reset	O	O	All outputs

Field Calibration methods

If you need to reposition the Stopper after site installation, you must calibrate it in the following way.

The next calibration method is to calibrate with the button operation on the upper part of the transmitter, and remove the upper name plate protecting the operation button and calibrate it.

A	B	
		1. LEVEL A -> B in this order. 2. For Distance C-> D in this order. * If you need to change the LRV value between A and B or between C and D ZERO 1 function should be added. In this function, the position of the stopper should be in condition condition of A condition in LEVEL and condition condition of C in case of distance.
Float Ball to Lower Stopper Located behind Zero trim2 I do.	Place Float Ball on Upper Stopper I do.	
C	**D**	
		
Float Ball to Upper Stopper Run back Zero trim do.	Float Ball is placed on Lower Stopper and SPAN is executed. do.	

1 ZERO In the initial screen, if you press ZERO button for 3 seconds, ZERO appears on the LCD window and then press ZERO button for 3 seconds ZERO is executed while the -ZR- phrase is displayed.

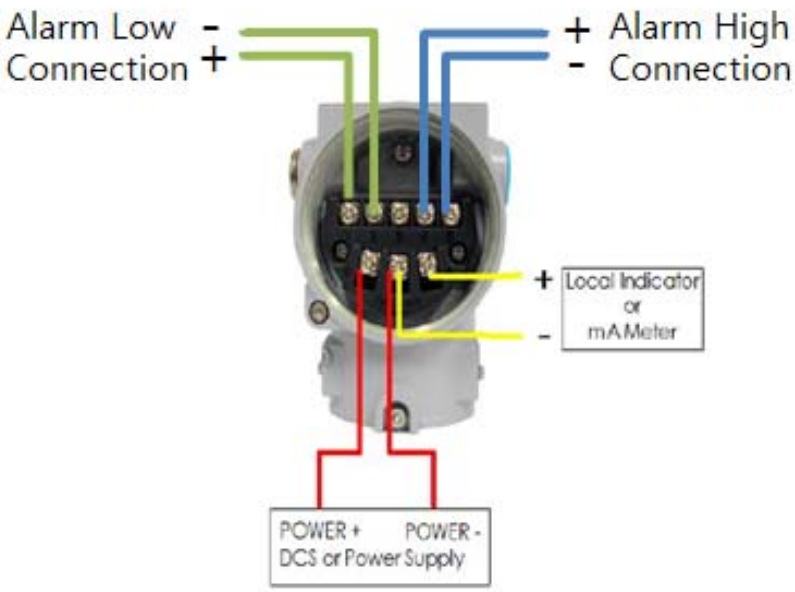
2 Zero trim Press ZERO button for 3 seconds on the initial screen, ZERO appears on the LCD window, then press SPAN button for 3 seconds after that, -TR-phrase will appear and Zero trim will be executed.

3 SPAN Press SPAN button on the initial screen for 3 seconds to display SPAN on LCD window and then press SPAN button for 3 seconds SPAN is executed with the -SP- statement.

Terminal Connection

* Output Signal : **4-20mA, HART, HIGH-LOW ALARM(NPN Open Collector) Type**

■ Wiring



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Autrol Corporation Of America

796 Tek Drive, Crystal Lake, IL 60014, USA
Tel: +1 847-857-6062, +1 847-779-5000 Fax: +1 847-655-6062
Email: info@autroltransmitters.com
www.autroltransmitters.com