Ultrasonic Level Transmitter
Operation Manual

FinkTek Co., Ltd.
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08-EAX-B6-EK,01/26/2024

Contents

1. Reading Labels

Thanks for purchasing FineTek's Product. This operation manual describes the product features, working principles, operation and maintenance methods. It makes the user fully understand how to use the product correctly, so as to prevent dangerous situations such as device damage or operator injury.

- Please read this operation manual completely and carefully before using the product.
- Please contact the company if this operation manual can't satisfy your demands.
- The content of the operation manual is updated based on the version upgrade, which will be uploaded to the website for the user to access.
- Please don't disassemble or repair the product on your own, as this will make you disqualified from availing of the warranty service. Please send the product back to the company for repair and calibration, or just contact the company.
- Explanation of warning signs:

Danger→ It indicates that wrong operation will cause death or major disasters.
Note→ It indicates that wrong operation will cause injury and device damage to some extent.

Electric shock→ It warns of possible electric shock.

Fire→ It warns of possible fire.

Prohibited→ It indicates the prohibited wrong behavior.

2. Product Warranty

2.1 New Product Warranty

- We don't charge for the inspection, part/s and repair for the product of the company that has a defect within 12 months from the delivery date and meets the warranty terms.
- If the product defect is not due to human error during its transportation, user may change to a new unit from the company within 7 days from delivery date.
- When the product needs to be sent back to the factory for repair, please send the whole set, and don't disassemble the parts. Moreover, please be sure it is completely packed to avoid damage and causing more loss and defect during the transportation.
- The warranty is not available for causes that fall under the following circumstances, for which the company shall charge for the inspection, part/s and repair according to the actual condition:
  - The product or its parts are beyond the warranty period.
  - Fault or damage is caused by not following the instruction and use environment described on the operation manual.
  - The product damage is caused by a force majeure factor (natural disasters, floods, fire, earthquakes, lightning, typhoon, etc.), human destruction (scratches, dropping, latch broken, tapping, cracks and punching), human error (using improper voltage, high-humidity, water leakage, stain, corrosion, loss, improper storage, etc.) and other abnormal factors.
  - The damage is caused by the customer or the 3rd party through the installation, addition, expansion, modification and repair of parts not authorized or certified by the company.
  - The volume label information is wrong or unclear, so the product serial number can't be confirmed.

2.2 Repair Warranty

A **6-month** warranty service is provided for the repaired part of the product, during which the same product can be repaired free of charge in case of the same fault.

2.3 Service Network

Company	Address	Telephon	Fax
Taipei Headquarters (Taiwan)	No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678	+886 2 2269 6789	+886 2 2268 6682
Taichung Sales office (Taiwan)		+886 4 2465 2820	+886 4 2463 9926
Kaohsiung Sales office (Taiwan)		+886 7 333 6968	+886 7 536 8758
Fine automation Co., Ltd. (China)	No. 451, Duhui Road, Zhuanqiao Township, Minhang District, Shanghai City 201109	+86 021 64907260	+86 021 6490 7276
Aplus FineTek (Sensor Inc.)	355 S. Lemon Ave, Suite D, Walnut, CA 91789	1 909 598 2488	1 909 598 3188
FineTek Pte Ltd. (Singapore Branch)	No. 60 Kaki Bukit Place, #07-06 Eunos Techpark 2 Lobby B, Singapore 415979	+65 6452 6340	+65 6734 1878
FineTek GmbH (Germany Branch)	Bei den Kämpen 26 21220 Seevetal-Ramelsloh, Germany	+49 (0) 4185 8083 12	+49 (0) 4185 8083 80
FineTek Co., Ltd. (Indonesia Branch)	Ruko Golden 8 Blok H No.38 Gading Serpong, Tangerang Indonesia 15810	+62 (21) 2923 1688	+62 (21) 2923 1988

3. Product Inspection

3.1 Check Content

- 1 Ultrasonic Level Transmitter

3.2 Safety Inspection

- Please check whether the external package is deformed or damaged. Please remember to take a picture for evidence for compensation later.
- After unpacking, please check whether the content is deformed or damaged, or has any quality problem. Please remember to take a picture for evidence for compensation later.
- After unpacking, please check whether the content is consistent with the ordering info, and whether the quantity is right.
- Please contact the company within 7 days if any of the above situations occur (attach the picture together with your complaint). Otherwise, we won't compensate for, change or repair the product defect.

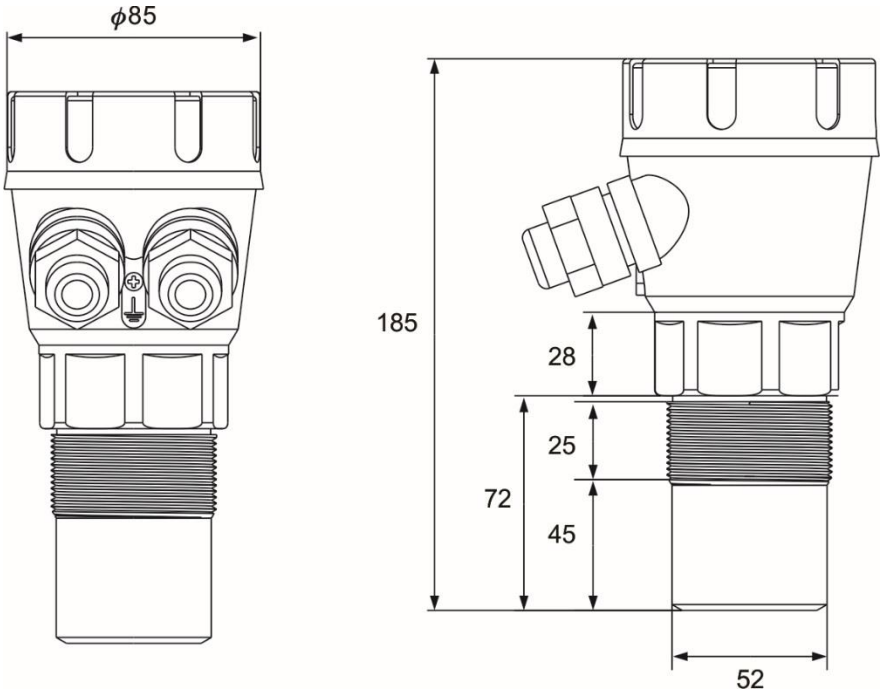
4. Summary

EAX is a compact, loop-powered ultrasonic level transmitter for continuous measurement of liquids. As a price leader, it does not compromise on good value; and provides effortless and intuitive operation. Easy and flexible mounting combined with high chemical compatibility and 12-metre measuring range makes the EAX suitable in multiple applications in all industries.

5. Product Features

- 4~20mA 2 wire output (Fully isolated) with HART
- 7~30Vdc power supply
- IP67 protection casing
- Transmitter material: PVDF
- False echo detection
- Internal temperature compensation.
- Beam angle: 7
- Not affected by liquid temperature, S.G, viscosity.
- Maximum range to 12 metres (40ft)

6. Dimensions & Wiring



7. Working Principles

During operation, the device emits a wave to the medium to be measured. The wave reflects off the surface and moves back to the device where a transducer calculates the distance. The distance is based on the time interval between transmission and reception of the wave. D= (334.1+0.6t) x T/2, where the D = the transmission distance; t =temperature; and T= transmission time.

With 4~20mA output, it can be connected to the PLC, DCS and SCADA systems. In addition, it is also equipped with exclusive PULSE and AGC (Auto Gain Control) echo tracking technology to ensure accuracy and precision even in the harshest environments.

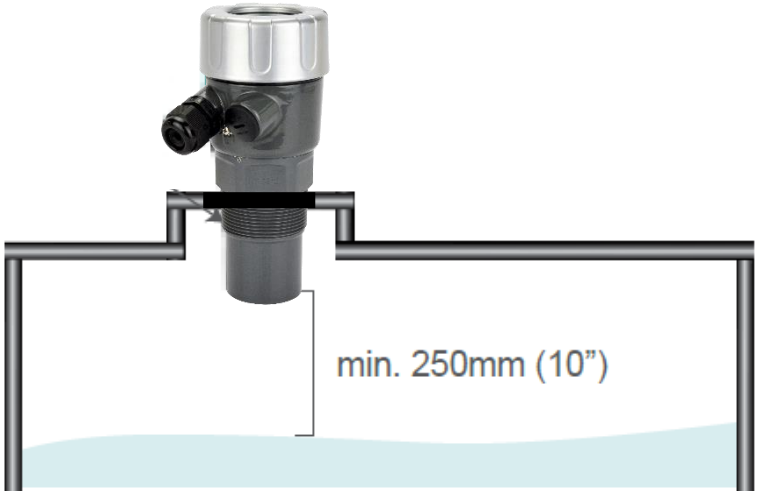
8. Specification

Frequency	50 kHz
Operating Voltage	7 - 30VDC at the terminal (residual ripple no greater than 100mV)
Power Consumption	500mW @ 24VDC
Analog Output	4-20mA modulating output module with HART (Recommended 250 Ohm @ 24VDC)
Analog Resolution	14 bits
Communications	4-20mA with HART
Blanking Distance	250 mm (10 inch)
Maximum Range	12 metres (-40~60°C) 8 metres (-40~70°C)
Resolution	1 mm (0.04”)
Electronic Accuracy	+/- 0.25% of maximum range
Operating Temperature	-40°C~70°C
	LCD temperature:-40°C~60°C
Maximum Operating Pressure	-0.5 to 3 bar
Beam Angle	7°
Materials	Transducer: PVDF Housing: Powder coated aluminium
Display	4 line graphic display
Keypad	4 keys = CAL, RUN, UP, DOWN
Enclosure Sealing	IP67
Cable Entries	M20 cable glands
Mounting	2” BSPT Thread, 2” NPT Thread
Typical Weight	1kg (2.2 pounds)

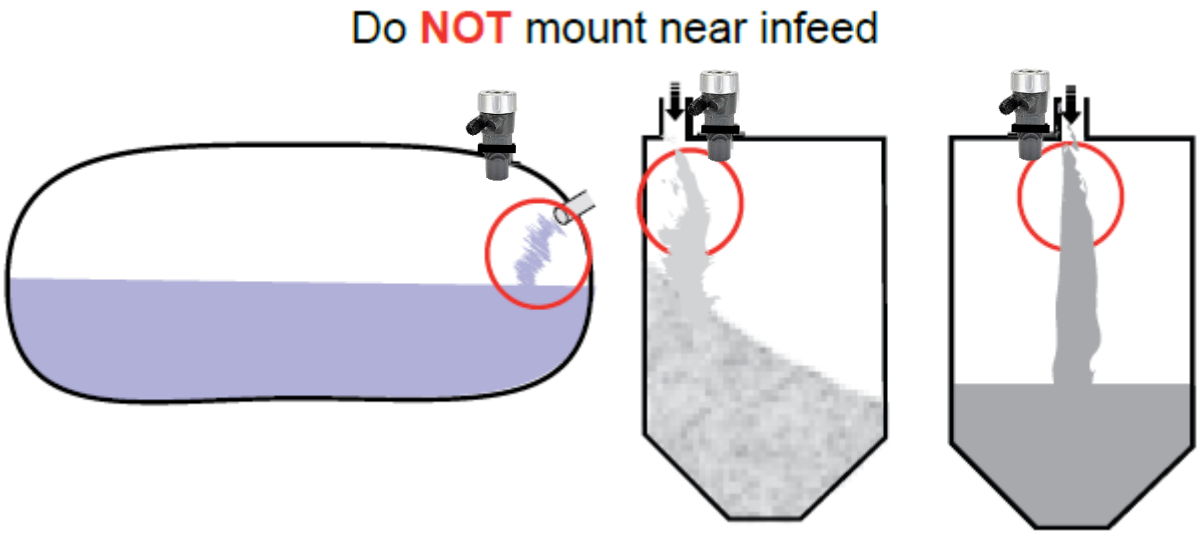
9. Installation

9.1 Mounting

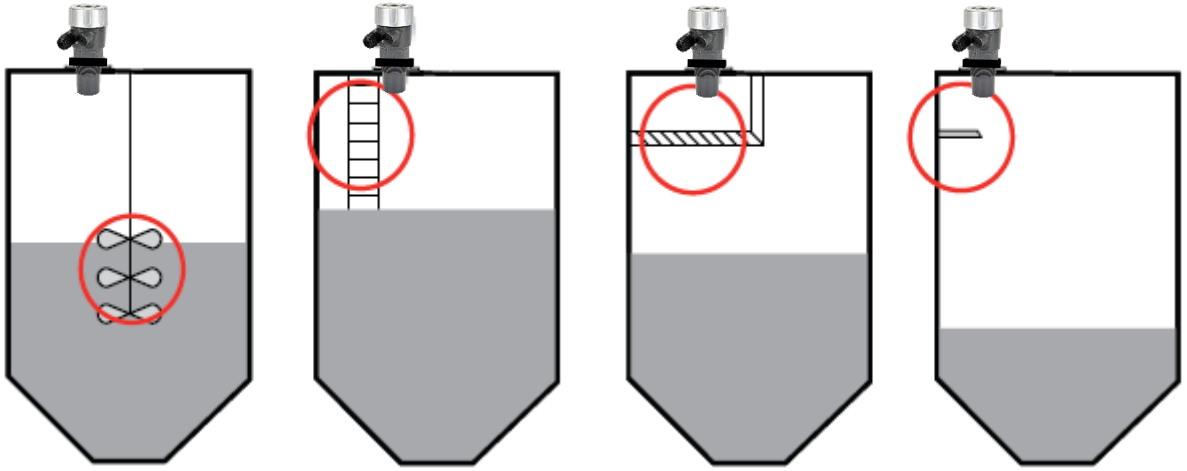
- Sensor should be mounted 1/3 the diameter of the vessel from the vessel wall
- Unit should never be closer than 250mm (10") to the liquid surface
- Do not mount over or near objects which can interfere
- With the unit measurement
- Do not mount in the centre of a curved roof to avoid



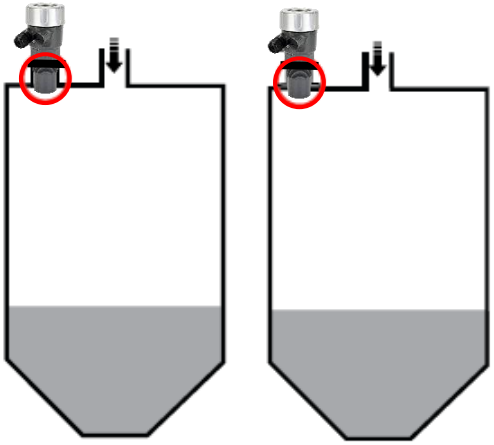
These are examples of common INCORRECT mountings which can prevent the unit from operating correctly.



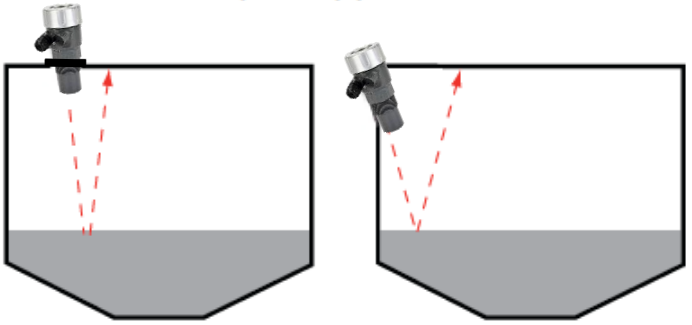
Do **NOT** mount over or adjacent to **any** obstacles



Do **NOT** mount cone or transducer face above roofline



Do **NOT** mount on angle in liquid applications

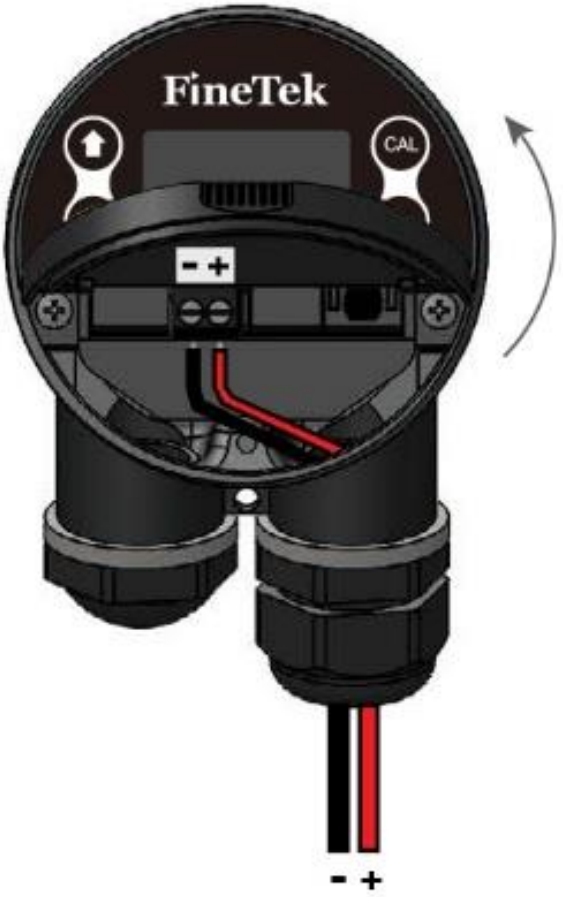


9.2 Powering The Unit

When power is applied, the unit will start up automatically. The LCD will scroll through its boot diagnostics and display the serial numbers, software version and model types for the amplifier and transducer.
The selected Display Mode will be visible with a measurement.
The top right hand corner diagnostic indicates either the operating mode or the current output.
The unit will re-scan for the level whenever it is powered up.

Display Mode

Diagnostic

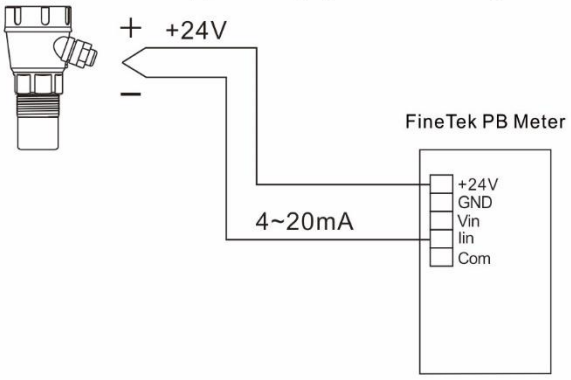


9.3 Interface

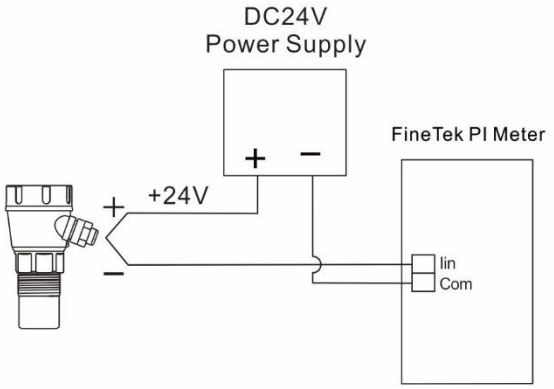
Button	Action	Navigation / Function
	Press and release Press and hold for 3 seconds	Access Main Menu Select / Proceed Access AutoSet Menu
	Press and release	Cancel / Return Re-activate unit
	Press and Release	Scroll between live diagnostics Scroll between menu options Adjust parameters

9.4 Installation

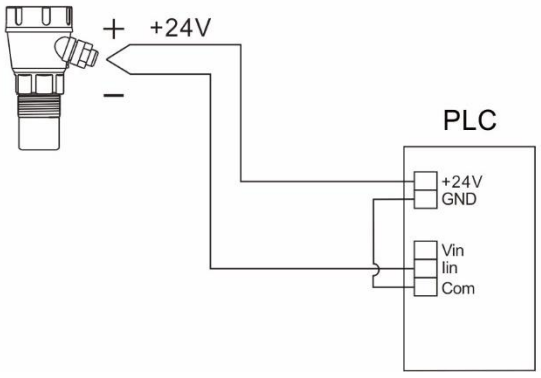
2-wires (power supplied by panel meter)



2-wires power supply (external)

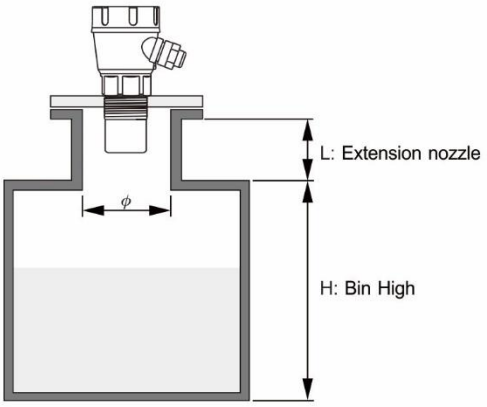


4-wire (PLC)



The ultrasonic transducer is mounted to the flange of the extension nozzle of the tank. Please refer to the instruction below:
Length for dead band:
Dead band has to be 150mm over extension nozzle .
Dead band needs to be set as 500mm if extension nozzle is shorter than 500mm.
Extension length:
Please refer to below table and choose the suitable probe

Flange size	Diameter of extension nozzle (ϕ)Min	Diameter of extension nozzle (Max)
3"	75mm	300mm
4"	100mm	300mm
6"	150mm	400mm
8"	200mm	600mm
12"	300mm	600mm



10. Parameter Functions

10.1 Startup

The EAX uses automatic sensitivity control to detect and maintain the level. After applying power to the unit allow 20-30 seconds for the unit to adjust to the application*.

*For best results ensure there is a liquid level present in the application or flat surface below the transducer

10.2 Main Menu

To access the Main menu 

press

To access AutoSet menu press and 

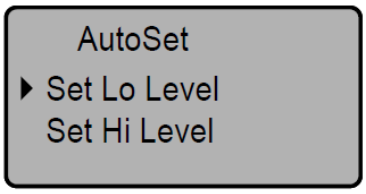
hold for 3 seconds

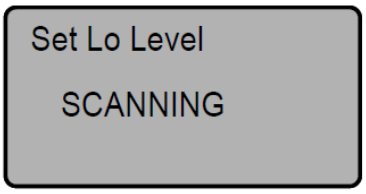
10.3 Setup

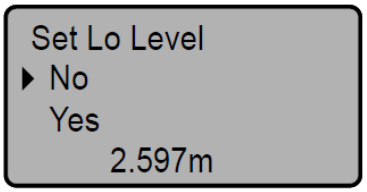
Parameter	Description	Options		
Display Mode	Set LCD measurement display mode	Level	% Level	Space
Display Unit	Adjust displayed measurement unit	CenMetre	Metres	Feet
Low Level	Set Low level measurement point (4mA)	Adjustable		
High Level	Set High level measurement point (20mA)	Adjustable		
Damping	Adjust output response time & smoothness	Adjustable in seconds		
Failsafe	Set failsafe output	3.50mA 4mA	3.80mA 20mA	20.20mA LastKnown

10.4 AutoSet

Use AutoSet to scan and program the unit High or Low level to the distance detected. After the scan you will be prompted to accept the distance measured. The High and Low level can also be manually adjusted in 'Setup'.





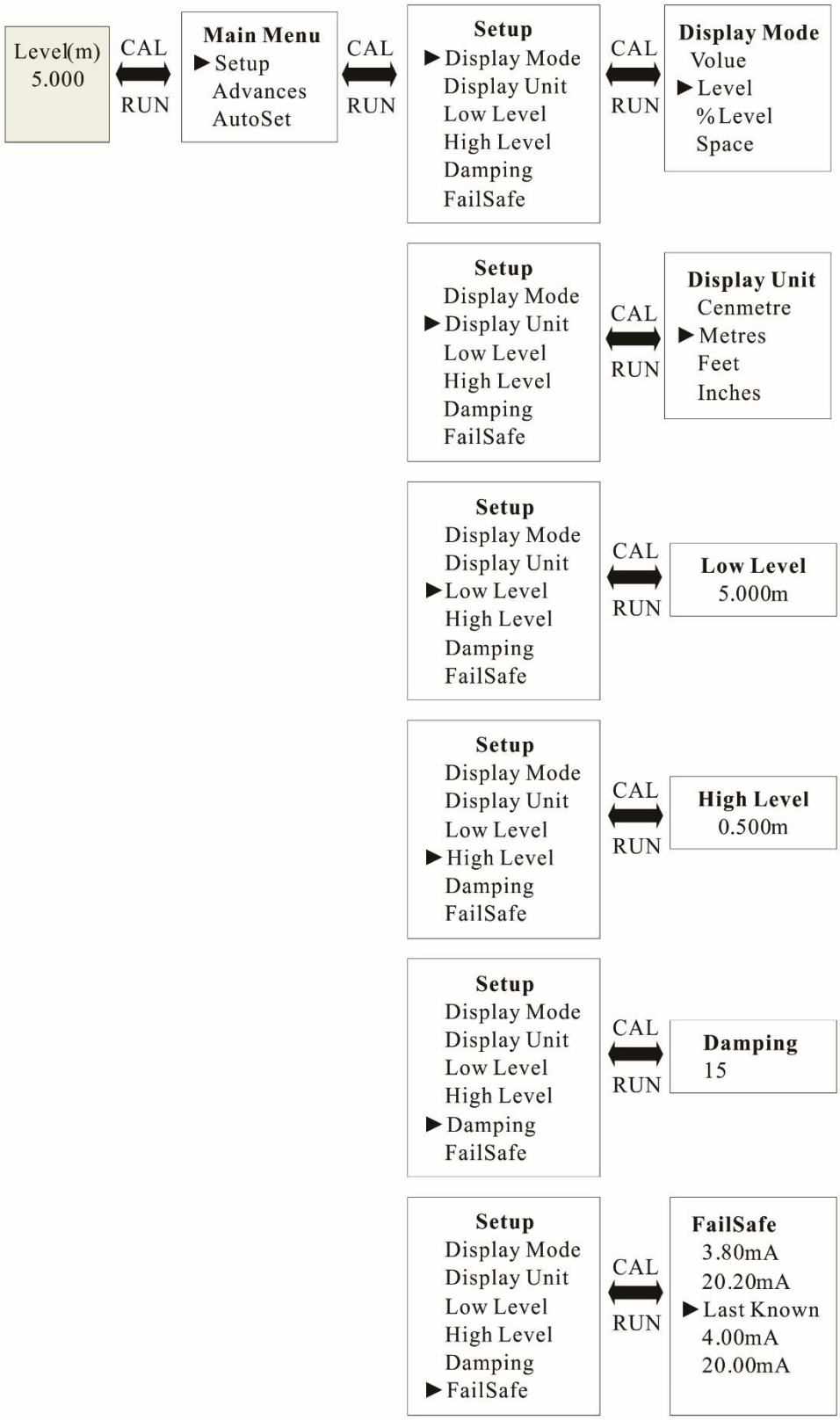


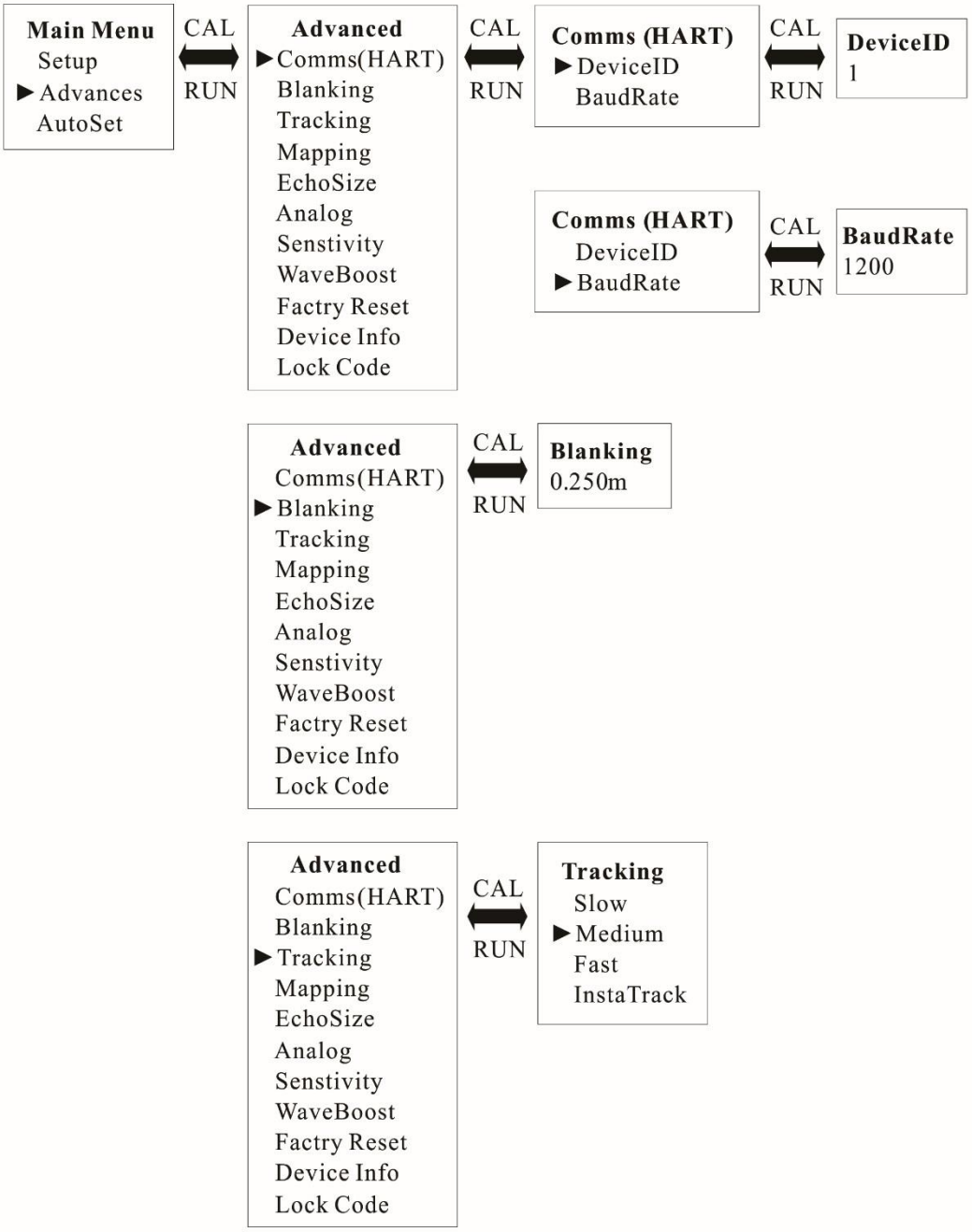
10.5 Advanced Settings

Parameter	Description	Options	
Comms	Adjust HART protocol settings.	Device ID Default 1	BaudRate 1200
Blanking	Blanking is a dead-band / non measured range. The unit cannot measure within this range.	Adjustable - recommended default 250mm (10")	
Tracking	Adjust tracking response time for application. The faster the tracking, the more responsive the measurement is, but it is less smooth the output signal. InstaTrack provides pulse by pulse live measurement.	Slow Medium Fast InstaTrack	
Mapping	Mapping creates a digital 'map' of false echoes caused by problem mounting and structures. Select 'ExecuteMap' to set a mapped distance, conduct or delete Mapping. Select 'MappedDist' to view a previously mapped distance.	MappedDist	
		ExecuteMap	Set Map Dist

EchoSize	The unit will target this echo size (measured in signal voltage) during operation. High values can increase stability but make the unit more susceptible to false echoes. Lower values can make the unit less sensitive and less likely to see false echoes.	0.4 - 2.49V Default 0.59V	
Analog	Adjust Analog output. Switch from 4-20mA to 20-4mA and fine tune both 4mA current and 20mA current.	4-20mA 20-4mA	Tune 4mA Tune 20mA
Sensitivity	Increase or decrease the unit Automatic Sensitivity Control range. 20 is maximum / highest Sensitivity.	0: Lowest 10: Default 20: Highest	
WaveBoost	WaveBoost adds additional echo amplification on top of the Automatic Sensitivity Control. WaveBoost should only be used if maximum Sensitivity is not sufficient.	0: Lowest (default) 20: Maximum	
Factry Reset	Restore all parameters to factory default.	Yes / No	
Device Info	Displays product type, serial number & software revision.		
Lock Code	Enable / Disable lock code. If enabled, select lock code number.	Enable / Disable Default Disabled	1-200

10.6 Settings frame diagram




Main Menu
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Mapping
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WaveBoost
Factry Reset
Device Info
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Tracking
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EchoSize
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Senstivity
WaveBoost
Factry Reset
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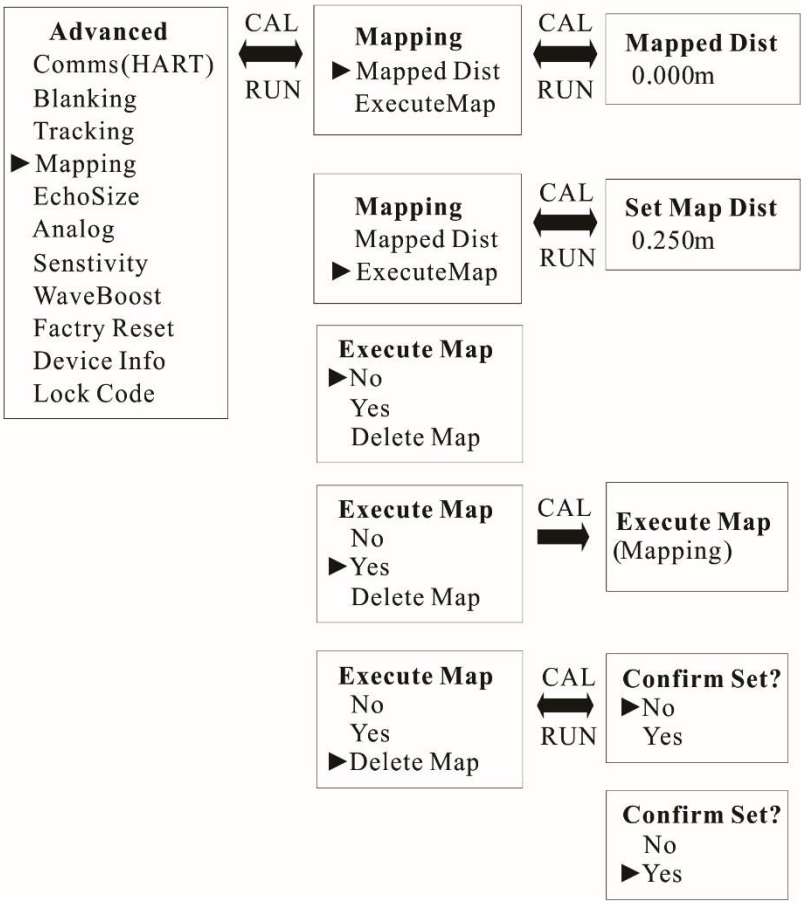
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Set Map Dist
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▶No
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▶Yes
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Confirm Set?
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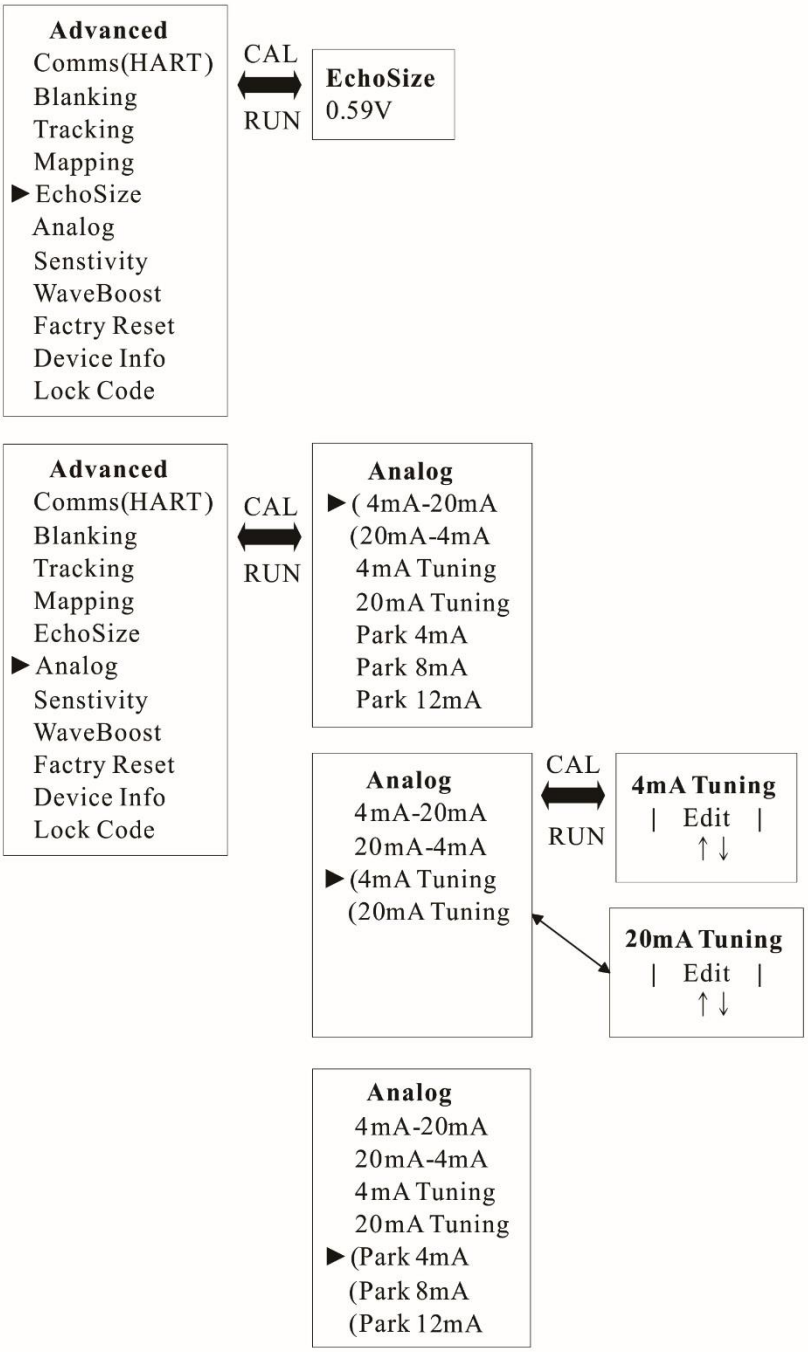
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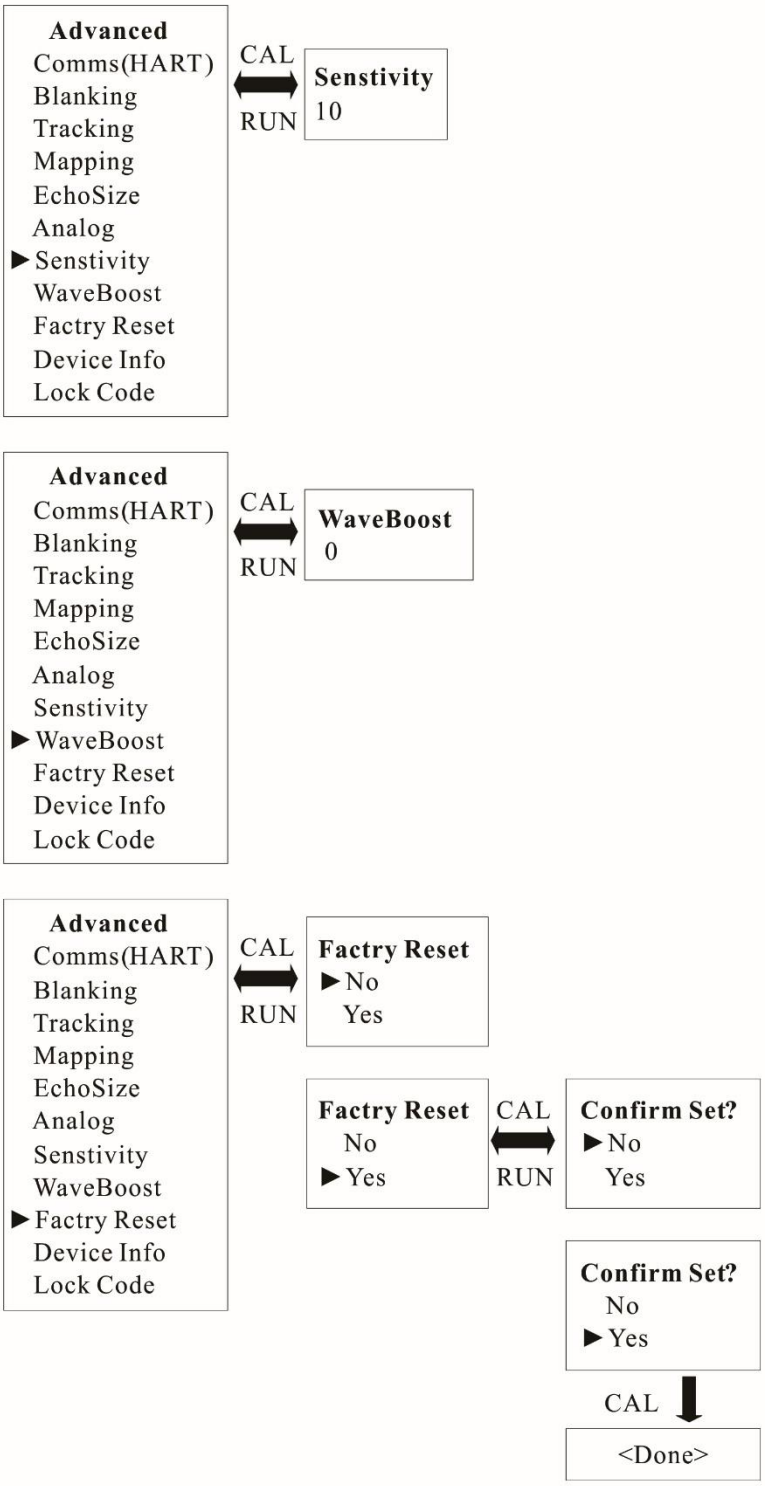
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Comms(HART)
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Confirm Set?
No
▶Yes
CAL
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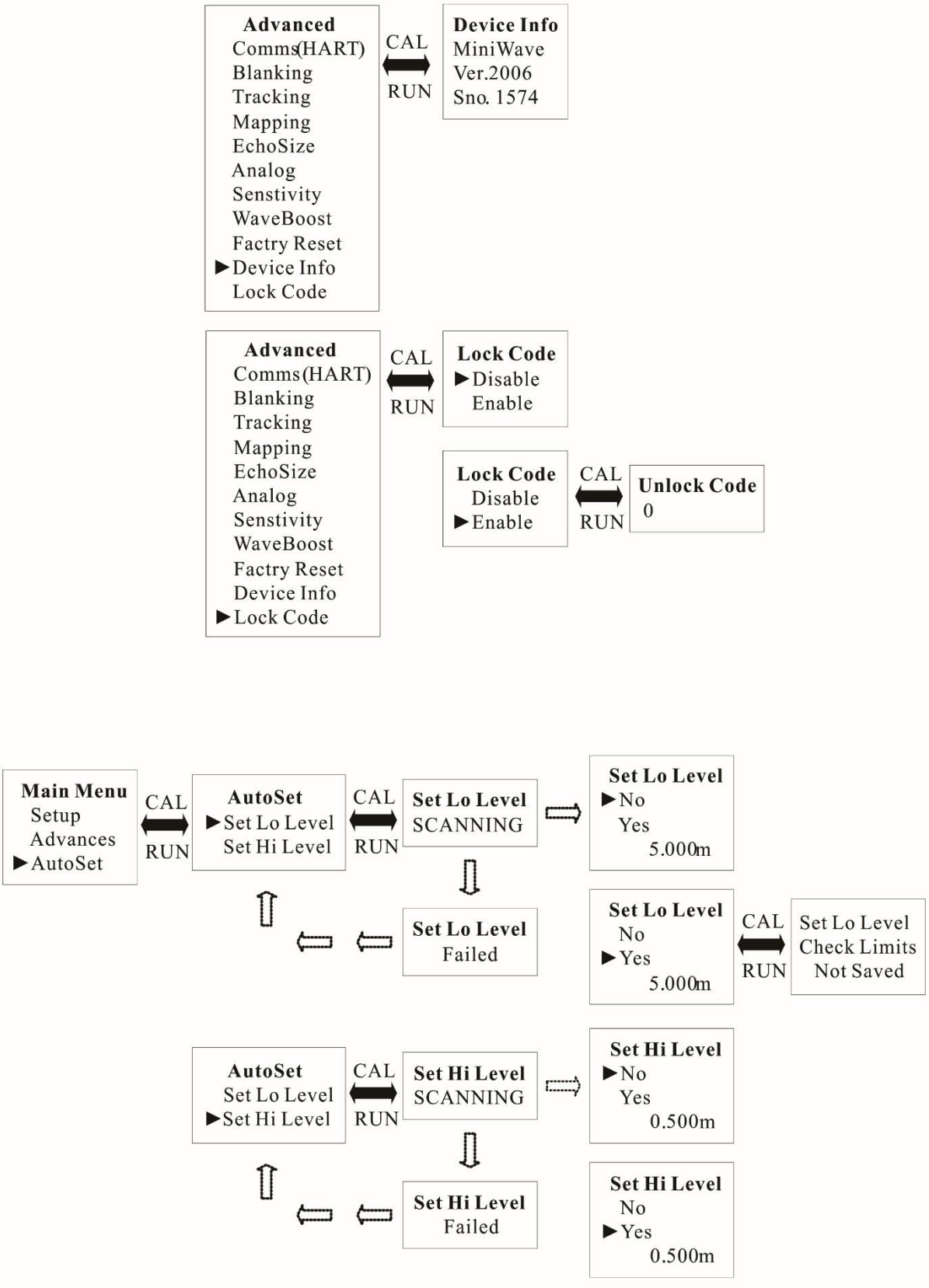
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Device Info
MiniWave
Ver.2006
Sno. 1574
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Senstivity
WaveBoost
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Device Info
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▶Disable
Enable
Lock Code
Disable
▶Enable
Unlock Code
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Main Menu
Setup
Advances
▶AutoSet
AutoSet
▶Set Lo Level
Set Hi Level
Set Lo Level
SCANNING
Set Lo Level
Failed
Set Lo Level
▶No
Yes
5.000m
Set Lo Level
No
▶Yes
5.000m
Set Lo Level
Check Limits
Not Saved
AutoSet
Set Lo Level
▶Set Hi Level
Set Hi Level
SCANNING
Set Hi Level
Failed
Set Hi Level
▶No
Yes
0.500m
Set Hi Level
No
▶Yes
0.500m

11. HART

HART Universal / Common Practice command list
The MiniWave supports the following Universal and Common commands

Command No.	Function
0	Read unique identifier
1	Read Primary Variable
2	Read current and percent of range
3	Read current and four predefined dynamic variables.
6	Write polling addr
7	Read loop configuration
8	Read Dynamic Variable Classifications
11	Read unique ident. associated with tag
12	Read message
13	Read Tag, Description, Date
14	Read PV sensor information
15	Read output information
16	Read final assembly number
17	Write message
18	Write Tag, Description, Date
19	Write final assembly number
20	Read Long Tag
34	Write damping value
35	Write range values
44	Write PV units
57	Read unit tag, descriptor, date
58	Write unit tag, descriptor, date
59	Write number of response preambles
109	Burst mode control
110	Read all dynamic variables

12. Troubleshooting

12.1 Unit is displaying incorrect distance

- Confirm display mode is suitable.
  Space is measured from Sensor face to measured level.
  Material is measured from Low Level to measured level.
- If unit is measuring too deep, increase Sensitivity.
  If the unit continues to measure too deep, increase WaveBoost.
- If unit is measuring too high, reduce Sensitivity and ensure WaveBoost is set to 0.
- Check if material is present to be measured. Unit will output and display FailSafe reading if it cannot detect a level within range.

12.2 Analogue trend is erratic/unstable

- Increase 'Damping' value for smoother trends.
- Choose a slower 'Tracking' speed.
- Check there are no objects interfering with the transit pulse in the application (such as ladders and cross beams).

12.3 Unit is locked up or flat line measurement

- Confirm there is material within measurement range, the unit may go to Failsafe if there is no flat level available.
- If the unit is locked to a high level perform Mapping for distance beyond false echoes.
- If the unit is locked higher than the real level check for objects interfering with the transit pulse in the application (such as ladders and cross beams).
- Lower the Sensitivity/WaveBoost. Re-locate the installation to avoid the interfering object.
- If the unit is locked lower than the real level confirm the application is not within Blanking distance.
  Increase Sensitivity/WaveBoost until unit measures correct level.
- Tracking speed may be too slow for the application.
  Increase Tracking speed.

12.4 PLC indication does not match measurement

- Connect a Multimeter in series with the powered loop. Compare the 'mA' diagnostic on the display with the mA reading on the loop. If these values do not match, disconnect the loop wires and measure the resistance across the loop. This should not exceed specification.
- Confirm High Level and Low Level are set to the same values in EAX and control system.

12.5 AutoSet fails

- Increase 'Sensitivity' to a higher value.
- Allow the unit to run for a longer time (one minute).
  Re-attempt the AutoSet.
- Increase WaveBoost and re-attempt the AutoSet.
- Set High and Low level manually in 'Setup' menu.

13. Transportation and Storage

To prevent the EAX Ultrasonic Level Transmitter from damage during the transportation, please keep the packaging condition as how it was when it was shipped from the factory before arriving at the installation site. The storage conditions should meet the following:

- Appropriate rainproof and damp-proof treatment must be conducted .
- Vibration must be reduced and collision with other objects must be prevented during its transportation.
- The storage temperature must be in the range of -40 ~ 60°C
- The humidity should be lower than 80%
- To store the used sensors, clean the tested medium attached on the lining and the electrode, and avoid oxidation by not exposing it to too much air for a long time.
- Outdoor storage may degrade the performance of the flow meter.