HiTECH Technologies, Inc.

INSTRUCTION MANUAL

SuperMini™ SonicLaser™

Ultrasonic Level Transmitter

HiTECH **Technologies, Inc.**

1. APPLICATION

The SuperMini™ is a non-contacting ultrasonic liquid level transmitter; the transmitter comes with scaleable 4-20 mA output, programmable relay and HART communication. This smart level transmitter is well suited to measure most liquids under various process conditions and can be programmed using the magnet supplied or optionally via HART protocol.

2. TECHNICAL DATA

Type		SCA-36□-□	SCA-38□-□
Measuring range ($X_m - X_M$)		0.35 … 10m	0.25 … 6 m
Material		PP	
Total beam angle		5°	
Ambient temperature		-30 °C … + 60 °C	-30 °C … +60 °C
Process temperature			-30 °C … +80 °C
Pressure (absolute)		0.3 … 3 bar (0.03 … 0.3 MPa)	
Power supply / Consumption		10.5 … 40 V DC, 3,6 W or 10.5 … 28 V AC / 4 VA	
Outputs (programmable)	Current	4-20 mA 600 Ω, galvanically isolated, (max. 250V), secondary lighting protection Error indication by the current output (programmable): 3.6mA; 22mA; hold last value	
	Relay	SPST (NO) 28 V AC/ 5 A; AC12 30V DC/ 5 A; DC12 For indication of echo loss (default) or for differential level control	
Digital communication		HART	
Repeatability		± 0,2 % of the measured distance +0.05% of the range	
Accuracy of the setting		With Touch–Magnet Programming ±20 mm	
Resolution		<2 m: 1 mm 2…5 m: 2 mm 5…10 m: 5 mm	
Damping		10 sec, 30 sec, 60 sec (programmable)	
Electrical connection		6x0.5 mm² shielded cable, ⌀7.5 mm, length:3 m (can be ordered up to 30 m)	
Electrical protection		Class III.	
Ingress protection		IP 68	
Weight		≈1.2 kg	

3. ORDER CODE

SuperMini™ S C A — 3 ☐   ☐ — ☐

Range	Code
10 m	6
6 m	8

Mounting / Material	Code
1" BSP or 1" and 2" BSP	0
1" BSP and 2" NPT	N
1" BSP fast connecting gland / PP	F
Mounting bracket 200 mm	K
Mounting bracket 500 mm	L
Mounting bracket 750 mm	M

| Output	Code
4 … 20 mA+relay	2
4 … 20 mA+HART+relay	4

4. INSTALLATION

ATTENTION!   *Before mounting the unit in its final position, make sure that the programming points of the unit are accessible with the supplied magnet, the LEDs are clearly visible and the level of the liquid can be changed between its minimum and maximum during the programming session. If any of the above conditions are not met, the programming should be carried out before mounting the unit in its final position. (See 5. Programming)*

When mounted on a pipe, we recommend the use of the SAA-110 transparent pipe connector that enables on-site programming.

Positioning:
The optimal position of the SuperMini™ is between r=(0.2 to 0.4)d of the tank. This will prevent unwanted interference caused by dome-top tanks.

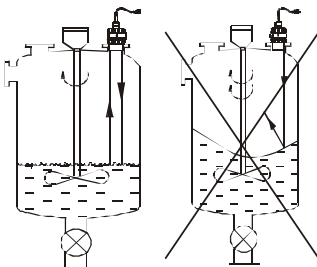The sensor face has to be parallel with the surface of the liquid within ± 2°.
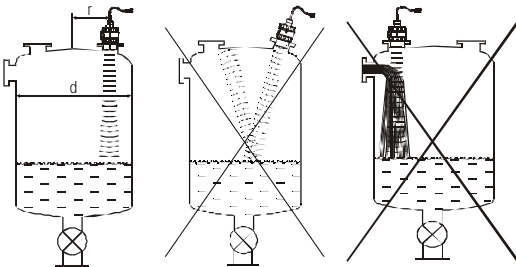
Obstacles:
No object should protrude into the sonic beam of the device (e.g.: ladder, baffle, etc.).

Foam:
Foam on the surface of the liquid can make ultrasonic measurement difficult or not operate correctly.
Mount the device in a location where foam is minimal or use a stilling well.

Wind:
Intense movement of air may affect measurement accuracy or cause unit to become inoperative.

Vapors, fumes:
Vapors and fumes of gases may radically reduce the measuring range of the device (e.g.: chemicals, outdoor tanks under sunshine).

Stand-off pipe:
The structure of the stand off pipe should be rigid; the inner rim where the ultrasonic beam leaves the pipe should be rounded.
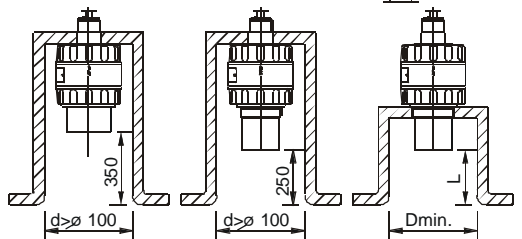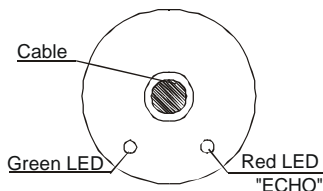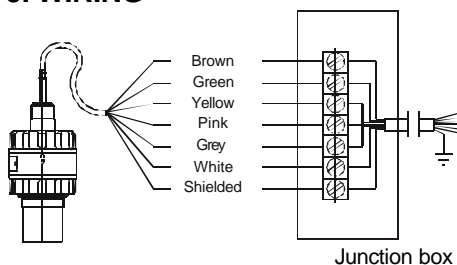
L	Dmin.
150	60
200	65
250	75

Temperature:
Excessive heat must be avoided (e.g. direct sunshine) to avoid inaccurate measurement.

5. WIRING

Brown
Green
Yellow
Pink
Grey
White
Shielded

Junction box

Cable

Green LED

Red LED
"ECHO"

Top view of the neck section

Denotation of the color wires:

- Brown — Power supply
- Green — Power supply
- Yellow — Relay output
- Pink — Relay output
- Grey — Current output
- White — GND
- Shielding — To be grounded

In case of DC power supply the unit is polarity-independent.

The relay is NO type

Three-wire installation is possible in case of DC power supply by connecting the GND and the (-) pole of the power supply. In this case galvanic isolation is not provided.
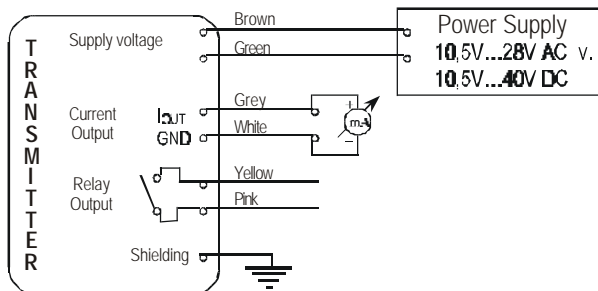
Extending the cable:

- When extending the cable, use a junction box. Shielding of the unit cable and that of the extension cable should be connected and grounded at the end of the extension cable.
- Extend only wires required for the purpose of the application.

6. Programming

After performing electrical installation according to 4. the unit is ready for operation. For ultimate temperature compensation accuracy, switch on the device 1 hour before programming.

Programming can be performed in two ways:

- *On-site*, using the liquid level as reflecting surface (only if the programming points are accessible on the unit, the LEDs are visible and the level of the liquid can be changed between the its minimum and maximum during the programming session).

Off-site, using a flat object as reflecting surface (e.g.: table or wall).
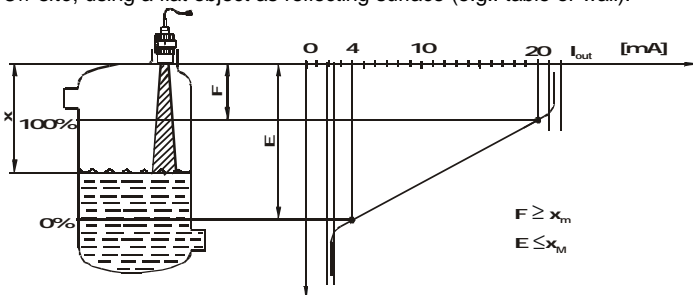
The following features can be programmed using Touch-Magnet Programming with the supplied magnetic screwdriver:

– Assignment of the 4mA analogue output to a required min. level / max. distance (E)
   (factory default: X_M max. measuring distance)
– Assignment of the 20mA analogue output to a required max. level / min. distance (F)
   (factory default: X_m min. measuring distance)
– Error indication by the current output (factory default: hold last value)
– Relay switching differential (if not programmed the relay is for echo loss indication)(factory default: echo loss indication, relay NO)
– Damping (factory default: 60 sec)

Note: Current output can also be assigned in inverted mode:

$$4 \text{ mA} = 100 \text{ \%}, 20 \text{ mA} = 0 \text{ \%}$$

ATTENTION! *When using off-site calibration, distance between the reflecting object and the unit must correspond to the required 4/20 mA values.*

Touch-Magnet Programming is only possible if the SuperMini™ receives valid echo i.e. "ECHO" LED is lit!

In case of SuperMini™ with HART communication (SCA - 3☐☐ - 4) Touch-Magnet Programming is only possible if the transmitter is in the "LEV" measuring mode (factory default).

The accuracy of the Touch-Magnet Programming is ±20 mm. Thus the relay switching difference between "ON" and "OFF" must be greater than 40 mm.

Interpretation of LED statuses:

● = LED is on,   ◑ = LED is blinking ,   ○ = LED is off
◑◑ = LEDs are blinking alternatively

The left-side LED symbol in the programming table below corresponds to the GREEN LED, while the right-side LED corresponds to the RED LED of the device.

Programming:
Open up the supplied screwdriver to access the magnet.
When programming, put the magnetic part to one of the symbols:

⋒ **A** or ⋒ **B** according to the programming sequence
described below and check the LEDs for their status.

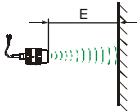magnet   screwdriver

Green LED   Red LED
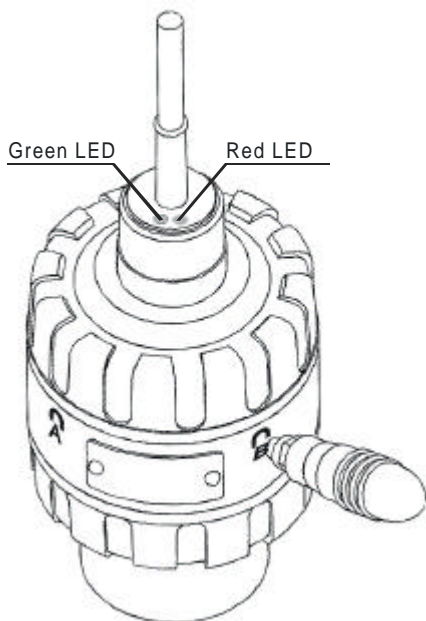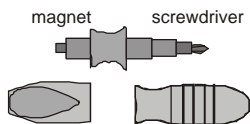
Make sure that after programming, the unit will not be exposed to a strong magnetic field!

Minimum level, 0%, empty tank (assignment to 4 mA)
Place the SuperMini™ at a distance from the target corresponding to the required minimum level.

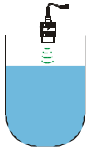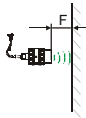| Action	LED indication
1) Check for valid echo	○● = Valid echo received, transmitter programmable
2) Place magnet to the symbol "**A**"	●● = SuperMini™ in programming mode
3) Hold magnet in place	●○ = Distance assigned to 4mA
4) Remove magnet when all LEDs are off	○○ = Programming completed
Use level in tank or a fix target e.g. the wall	

Maximum level, 100%, full tank (assignment to 20mA)
Place the SuperMini™ at a distance from the target corresponding to the required minimum distance/maximum level. (Do not forget to check for valid Echo!)

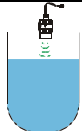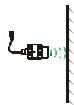| Action	LED indication
1) Place magnet to the symbol "**B**"	●● = SuperMini™ in programming mode
2) Hold magnet in place	○● = Distance assigned to 20mA
3) Remove magnet when all LEDs are off	○○= Programming completed
Use level in tank or a fix target e.g. the wall.	

Programming relay switch-on point (the level where the relay becomes energized)
Place the SuperMini™ at a distance from the target corresponding to the required switch-on point.
(Do not forget to check for valid Echo!)

Action	LED indication
1) Place magnet to the symbol "**A**"	●● = SuperMini™ in programming mode
2) Place magnet to the symbol "**B**"	○◐ = Programming in progress
3) Hold magnet to symbol **"B"**	◐● = Programming in progress
4) Place magnet to the symbol "**A**"	●○ = Programming of the switch-on point
5) Remove magnet when all LEDs are off	○○ = Programming completed
Use level in tank or a fix target e.g. the wall.	

Programming relay switch-off point (the level where the relay becomes de-energized)
Place the SuperMini™ at a distance from the target corresponding to the required switch-off point. (Do not forget to check for valid Echo!)

Action	LED indication
1) Place magnet to the symbol "**A**"	●● = SuperMini™ in programming mode
2) Place magnet to the symbol "**B**"	○◐ = Programming in progress
3) Hold magnet to symbol "**B**"	●● = Programming in progress
4) Keep holding magnet to "**B**"	○● = Programming of the switch-off point
5) Remove magnet when all LEDs are off	○○ = Programming completed

Use level in tank or a fix target e.g. the wall.

Note: To re-configure the relay for indication of ECHO LOSS, perform a RESET (see later) that will reset all parameters to default.

Programming "Error indication" by the current output
Place the SuperMini™ against a target to obtain valid Echo required for programming!

Action	LED indication
1) Place magnet to the symbol "**A**"	●● = SuperMini™ in programming mode
2) Place magnet to the symbol "**B**" repeatedly to select the required error indication mode	○◐ = Hold last value ◐○ = 3,6 mA ●◐ = 22 mA
3) Place magnet to the symbol "**A**'''	○○ = Programming completed

Note: The current output will be – according to the selected error indication – 3.6 mA, 22 mA or the last measured value as long as the error continues to exist.

"Damping"
Place the SuperMini™ against a target to obtain valid Echo required for programming!

Action	LED indication
1) Place magnet to symbol "**B**"	●● = SuperMini™ in programming mode
2) Place magnet to the symbol "**A**" repeatedly to select the required damping	○◐ = 10 sec ◐○ = 30 sec ●◐ = 60 sec
3) Place magnet to symbol "**B**"	○○ = Programming completed

Note: If your process allows it, leave the Damping at factory default (60 sec). Change it only if your process is fast and the output cannot track the level.

RESET: to factory default
Place the SuperMini™ against a target to obtain valid Echo required for programming!

| Action	LED indication
1) Place magnet to the symbol "**B**"	●● = SuperMini™ in programming mode
2) Place magnet to the symbol "**A**"	○◐ = Programming in progress
3) Hold magnet to the symbol "**A**"	◐○ = Reset in progress
4) Remove magnet when all LEDs are off	○○ = Programming completed

Indication of programming error (by the LEDs)

Action	LED status = error indicated	Correction
Attempted programming	◐◑ = blinking twice = No Echo	Find valid echo
Attempted programming	◐◑ = blinking three times = access denied (access code active)	Access code can be activated through HART only
Attempted programming	◐◑ = blinking four times = SuperMini™ not in "LEV" meas. mode	RESET the SuperMini™
Programming of the relay	◐◑ = blinking alternately = switch-differential too small	Set switch-differential greater than 40mm

7. DIMENSIONS
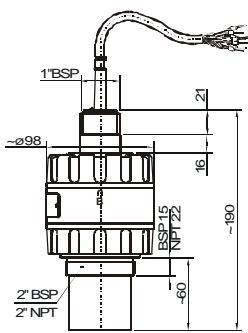
SCA-380
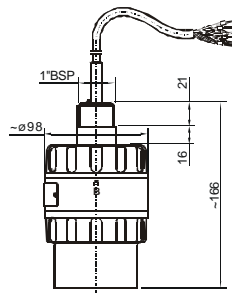
SCA-360

8. MAINTANENCE

The unit may require occasional maintenance of the sensor face by cleaning its surface, especially where sticky, adhering liquid may splash on it. A thin layer of dirt may not cause any trouble; however heavily fuming chemicals may reduce the efficiency of the sensor.
Equipment sent back for repair should be cleaned or sterilized by the User.

9. STORAGE CONDITIONS

Environmental temperature range: -35 ... +60°C. Relative humidity: max. 98 %

10. PERFORMANCE GUARANTEE

Since 1986, every instrument sold by *HiTECH* has been guaranteed to perform in the application it originally was engineered and recommended for. Our company policy remains the same, every product sold comes with a **written performance guarantee**.

Should the equipment be unable to perform satisfactorily in your application and we are not able to correct the problem, we will accept the instrument in return and issue full credit.

This performance guarantee is valid for 60 days. Thereafter, our standard limited two years factory warranty goes into effect.