

**SHW**

**INSTRUMENTATION**

# **CAPACITIVE LEVEL TRANSMITTER**



**TRNC 6.4**

## **INSTRUCTION AND OPERATION MANUAL**

**SHW Instrumentação Industrial e Comercial Ltda**

## Capacitive Level Transmitter

### TRNC 6.4 Model

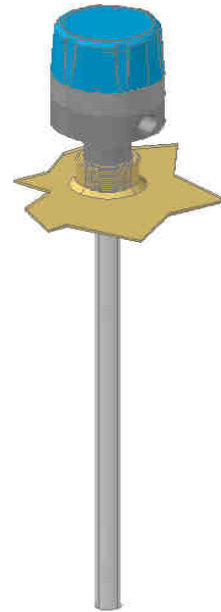
The Capacitive Level Transmitter TRNC 6.4 was developed for level measurement solutions in industries. The SHW Industrial Automation presents the product as a durable solution to mechanically process, simple installation and calibration, low cost and effective.

### Application Area

Measurements on liquids and granulated products. Meets most branches of industry, and highlights the grain level measurement, soya hulls, and masses of the process.

### Advantages

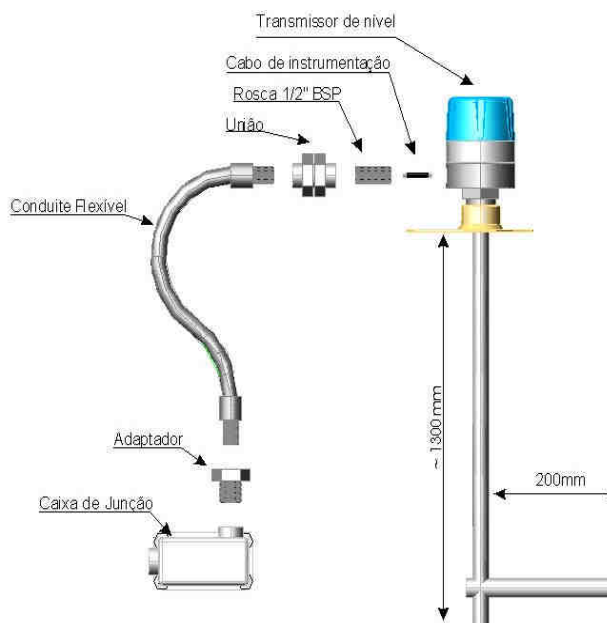
- Long life and low maintenance due to its robust mechanical construction;
- Flexibility concerning the possibility of shortening the measuring probe (procedure done by sending the instrument to SHW Automation);
- Maximum use of the reservoir or hopper, since the measurement is performed throughout the whole probe;



### Technical data

- Capacitive Level Transmitter TRNC 6.4 model
- Electronic model: TC 6.0 / TC 6.1
- Output signal: 4-20 mA - 2 Wire
- Power supply: 18 ... 30 VDC
- Insertion length: 1000 mm - 2000 mm (Normal measures)
- Process temperature: +20...+ 60 ° C
- Insertion Type: Fixed rod.

## Process connection



- The figure illustrates a typical installation in a hopper. Note that must be placed in the upper part of the hopper a screw connection with BSP 1 1/4 " 11 fpp. The nozzle must be a maximum of 200mm of the tank wall or one of the hopper walls.
- For transmitters operating with granulated products and with insertion length greater than 1300 mm should be provided further support for the probe. This support will be located in a distance of ~ 1300mm of the connection to the process, manufactured in insulating material, which does not agglomerate and not retain the product in processing.

- One should take into account the type of product to be measured, since low density materials tend to have a lower capacitance on the rod. The approach of the nozzle to the wall of the tank or hopper will result in a higher gain and better reading of the material. This can be done up to a distance that does not result in accumulation of material between the rod and the wall.

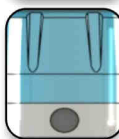
### Materials



The parts that come into contact with the product are stainless steel.

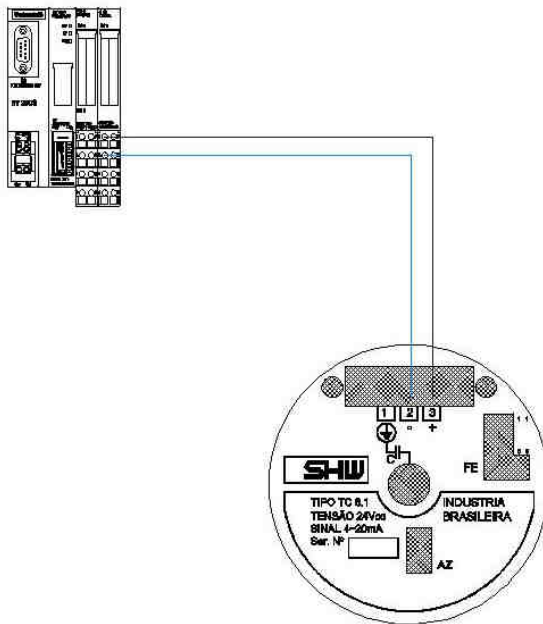


The isolation of the probe is PTFE



Head of the rod in Aluminum. Prevents oxidation and reduces the overall weight of the instrument.

## Electrical connection



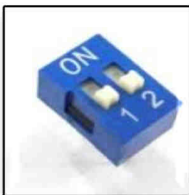
**NOTE:** This is an example of connection that simulates communication between the transmitter and one "I/O" module with analog input card.

Communication 4-20mA can be made between the transmitter and any module that has analog inputs, regardless of model or manufacturer.

- Avoid passing the signal cables by routes they have power cables or electrical switches.
- If the cable is shielded, it's recommended to ground the shield at only one end, and the end not used should be carefully isolated.
- In Hazardous Areas, requiring adequate protection to risk area in relation to risk of explosion, the cover must be tight and should not be opened while energized.
- To prevent ingress of moisture or corrosive gases, tighten the cover until the O-ring touches the housing and give a third more back to ensure sealing.
- Access to the cable connection terminals is done by a passage in the housing that can be connected to a conduit or cable gland. Conduit threads should be sealed as the sealing method is required for the area.

## Configuration

### Calibration selection



With the "Dip Switch" in position 1 and 0 ("Dip" 1 "ON" and "Dip" 2 "OFF") the transmitter works with the reading level of medium and high density products.

**Example:** Commonly used to read level in processes using as a main raw material the soya. It can also be used for reading mass and materials derived from other grains within the same density range .

With the "Dip Switch" in position 0 and 1 ("Dip" 1 "OFF" and "Dip" 2 "ON") the transmitter works with a greater gain in level variation, allowing the product level reading low density.

**Example:** Commonly used to reading level in processes that use as their main raw material sunflower. It can also be used for reading mass and materials derived from other grains within the same density range .

## Information

The level transmitter is previously calibrated in the SHW laboratory, needing only of adjustments of end scale and zero. This procedure should be adopted only for fine-tuning.

## Models of the electronic system

- The level transmitter has two models of electronic system that can accompany, model TC 6.0 and TC 6.1.
- The main difference between these models is that the TC 6.1 model you can choose between two types of calibration.
- The choice of calibration it's made by a two-way "Dip Switch" located on the right top corner of the electronics, where it is possible to select the type of calibration.

## TC 6.1 Model



- The TC 6.1 is the most current model of the electronics for use with Capacitive Level Transmitter TRNC 6.4.
- With output signal 4-20mA it's a cheap and easy solution for the process.
- Can be purchased separately.

## Calibration procedure

### Equipment required

#### Equipment



Precision digital multimeter, for measurement in mA range



Small screwdriver to adjustments in trimpot



Power Supply 24 VDC, to feed electronic circuit

### 1) Calibration

- For calibration of the transmitter follow the sequence:

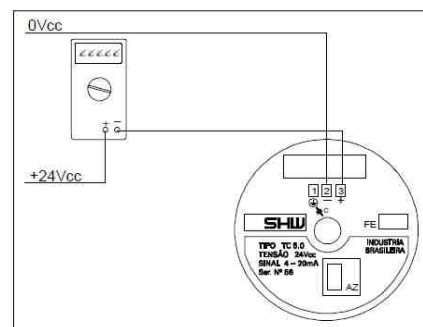
1.1) Install the instrument definitely in the process threading it into the previously prepared accommodation as the installation guidelines in the process.

1.2) Without material, we must obtain a signal current of 4 mA.

1.3) Fill the hopper with grain or granular material of the process until it touches the tip of the transmitter or to the level you want to be the "zero" of the process.

### Electrical connection for calibration

The electrical connection must follow the example bellow for calibration



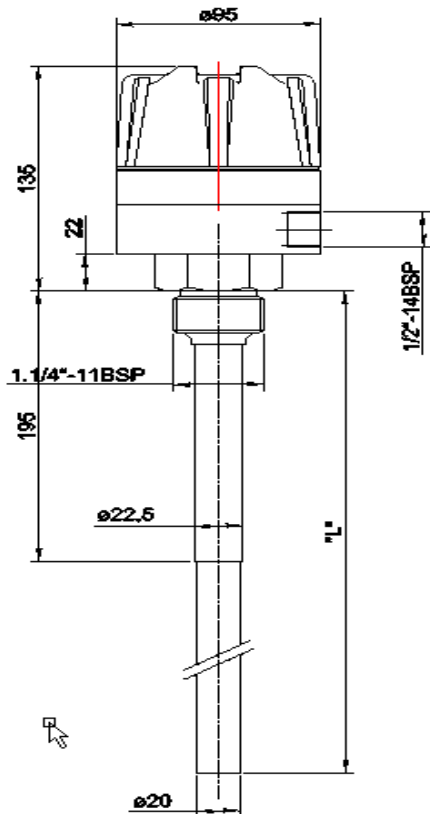
1.4) Turn the zero adjustment trimpot indicated with "AZ" to obtain the closest possible signal current value of 4 mA (minimum current). "The minimum signal current is found when, even turning clockwise the trimpot, the current value does not decrease."

1.5) Fill with more granular material to the level that it is intended to be the maximum of work.

1.6) Set the end scale turning the trimpot identified as "FE", getting a current signal of 20 mA or the maximum level closest of 20 mA.

1.7) Repeat the procedure if not get the expected results and if in doubt contact our technical support by the phone +55 14 3326-3161.

## Dimensions



## Accessories/Spare parts

- Muff coupling 1.1/4"
- Nylon support for probe (Indicated to rod from 1300 mm or more).

## Operation principle

Capacitance is the ability of a material to store electric charge. The value of the mutual capacitance is proportional to permittivity ratio of the dielectric material, which is a particular property of each material.

Furthermore, the product capacitance is influenced by proportion of density and moisture in same.

In the process, the product capacitance value changes when the level of material increases or decreases on the probe length.

Thus changing the capacitance eventually represents a change in the electrical signal emitted by the device, in this case, an output signal ranging from 4-20 mA.

## Information

Installing multiple TRNC transmitters on the same PLC:

When there is a situation that requires the installation of more than one transmitter for the same PLC is required installation of a converter/isolator in all transmitters connected to the same PLC.

