instrumentation
for fluids

Transmitters HALLTEC V
TH5, TH5T, TH5H, TH5TH

For Series

SC / SCH / SCV / SM / DP / LP

Instructions Manual

R-MI-TH5 Rev.: 1 English version

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1 INTRODUCTION

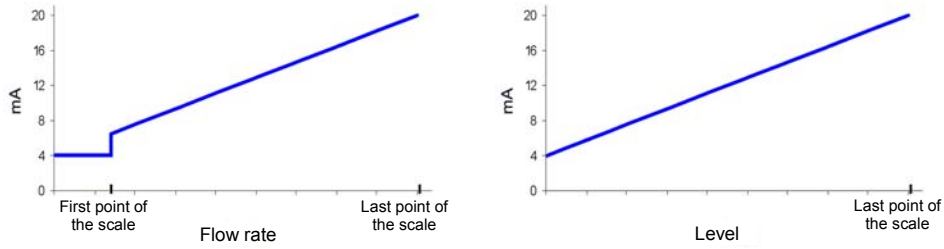
The Halltec V transmitter is an electronic position transducer with a microprocessor. The instrument uses the Hall effect to capture the field of a magnet. This signal, after the micro-controller processing, is converted to a current signal of 4-20 mA in a 2 wire loop. This signal is proportional to the flow rate.

2 MODELS

2.1 TH5

It is a 4 to 20 mA transmitter proportional to flow rate that incorporates a synchronized pulse output. 4 mA corresponds to beginning of the scale. 20 mA corresponds to full scale. Between the beginning of the scale and the first point of the scale the analog output is constant at 4 mA, to avoid false readings of flow rate.

In the case of level measurement (LP series), the current range corresponds to the scale at all the points.



1. Example: Response of the TH5 transmitter

2.2 TH5H

It is a TH5 transmitter that incorporates HART™ protocol compatibility. With this protocol the user can change the measuring range of the 4-20 mA loop, and data like flow rate and accumulated volume, with its associated measuring units.

2.3 TH5T and TH5TH

They are the equivalent models to those of the sections 2.1 and 2.2, but in addition they include a 8-digit totalizer (7 entire numbers and 1 decimal).

3 ELECTRICAL CONNECTION

For the electrical connection, the Halltec V has a screw terminal strip.

For the electrical installation it is recommended to use multiple conductor cables with individual cable sections in the order of 0.25 to 0.5 mm^2 in order to make it easier to connect.

A twisted pair wiring should be used to avoid electrical interferences in the 4-20 mA loop. In some instances, shielded cable may be necessary.

Before starting the installation, check that the cable glands are the right size for the cables to be used, this will guarantee the instrument will stay watertight. The cable glands used are for cables with outside diameters between 6 mm and 10 mm.

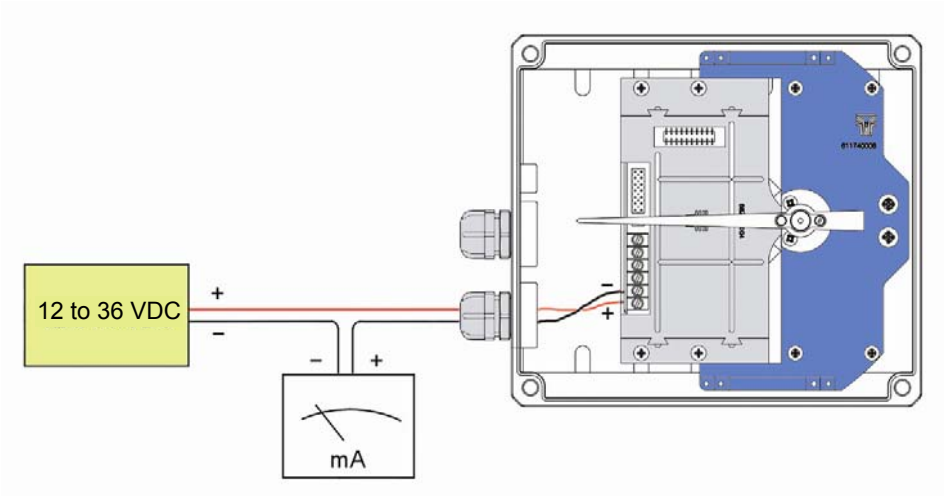
Peel the outside insulation to free the inner cables. It is recommended to tin the ends of the wires to avoid loose ends. Pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip. Once the wiring is finished make sure that the cables are well gripped by the cable glands to maintain the degree of protection.

The cable glands must be always closed. Entry of dust or some types of vapors can damage the internal system of bearings and therefore the equipment.

Before connecting the power supply, you must be sure that the supply voltage is the correct for the installation. The power supply voltage is indicated on the label of the transmitter.

To help in the wiring of the equipment, the description of the terminals is marked on the printed circuit next to the terminal strip.

3.1 Power supply and analog output

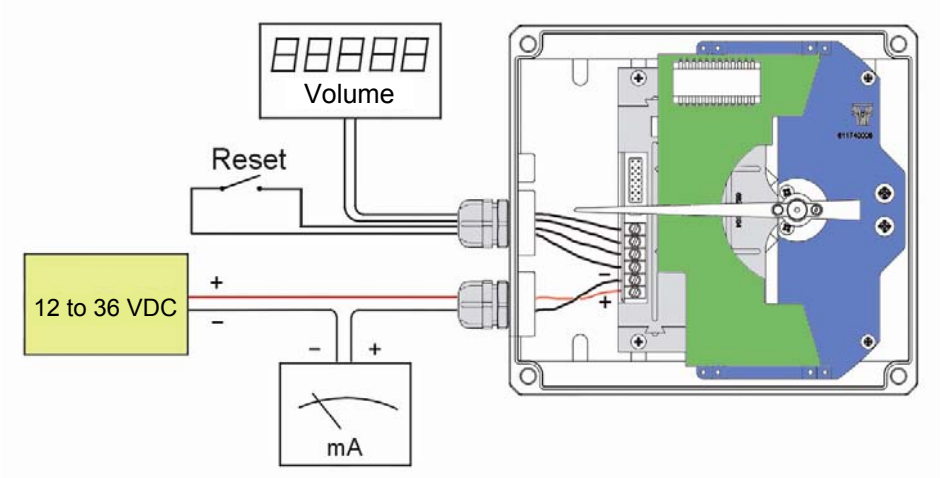


The connection is made in the terminal block. The positive terminal of the power supply is connected to the position + and the positive terminal of the load in the position -. The negative terminals of the power supply and the load are connected together. The instrument works in a 2-wire system, that is, the supply and signal line is the same. It is recommended to use a twisted pair wiring or shielded cable to avoid interferences in the current loop.

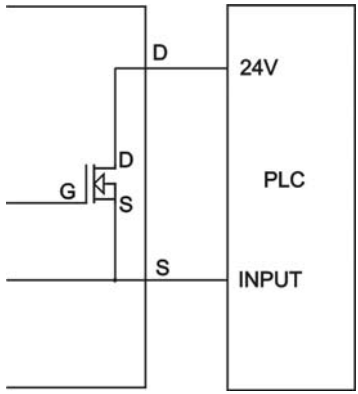
3.2 Pulse output and reset

The pulse output is connected in the positions D and S of the terminal block. The output is an N channel MOSFET isolated from the rest of the circuit and potential free. The S terminal is the source and the D terminal is the drain.

The lower terminals marked as RESET are a reset input for the totalizer. It can be connected a normally open potential free contact. It is important that the contact works well with low level signals, to avoid noise effects.



Note: The reset terminals are not isolated from the rest of the circuit. They may not be connected to other equipment.



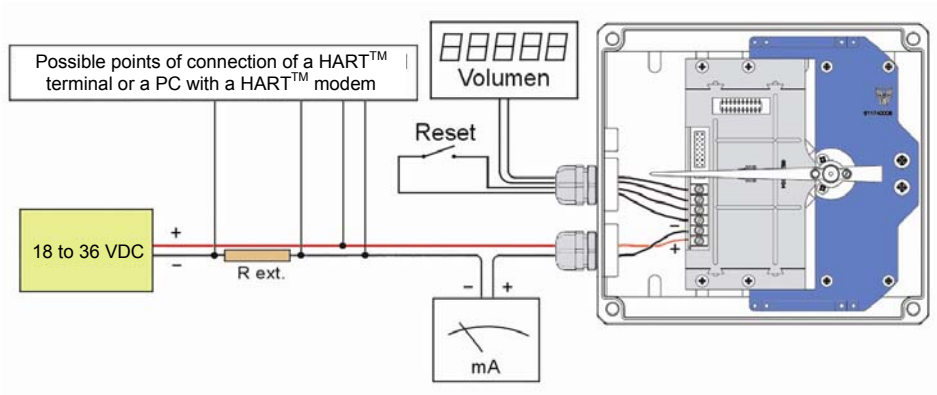
Example of the connection of the pulse output to a PLC

3.3 HART™ transmitters

In the case of a HART™ transmitter, an external resistor (R ext.) must be included. Its minimum value will be 200 Ω, and the maximum value will depend on the power supply as follows, **being the power supply voltage V, 18 VDC minimum.**

$$R(Ohm) = \frac{V - 14}{20 \cdot 10^{-3}}$$

In order to establish HART ™ communication, it is necessary to connect a terminal or PC with a HART ™ modem, in one of the points indicated in the following figure.



4 ADDITIONAL FUNCTIONS WITH HART ™ COMMUNICATION

The TH5H and TH5TH transmitters have a MODEM for HART ™ communication.
By means of the implemented commands, the user can obtain the following information:

- Flow rate value in real units
- Totalizer value in real units (even if the equipment does not have a display).

Note: The units of flow rate can be changed and they can be different from those of the scale of the instrument. Also, the units of flow rate and totalized volume, can be different.

- Reset or writing of a totalizer value.
- Change of beginning and end of scale of the current loop (a transmitter without HART ™ communication has always the beginning of scale at the zero point and the end of scale at the maximum point of the scale plate).
- Possibility of writing tags and messages into the instrument.

5 HART™ COMMUNICATION CHARACTERISTICS

The detail of the characteristics with respect to the HART ™ communication are available in the corresponding “Field Device Specification” document.

Resume of the principal communication characteristics:

Manufacturer, Model and Revision	Tecfluid S.A., TH5H, Rev. 0
Device type	Transmitter
HART revision	6.0
Device Description available	No
Number and type of sensors	1
Number and type of actuators	0
Number and type of host side signals	1, 4 – 20 mA analogic
Number of Device Variables	2
Number of Dynamic Variables	1
Mappable Dynamic Variables	No
Number of Common Practice Commands	12
Number of Device Specific Commands	2
Bits of Additional Device Status	12
Alternative working modes?	No
Burst mode?	No
Write Protection?	Yes

Electrical characteristics referred to the analog loop and communications:

Reception impedance

Rx	>	3,3 MΩ
Cx	<	1000 pF

6 "WRITE PROTECT".

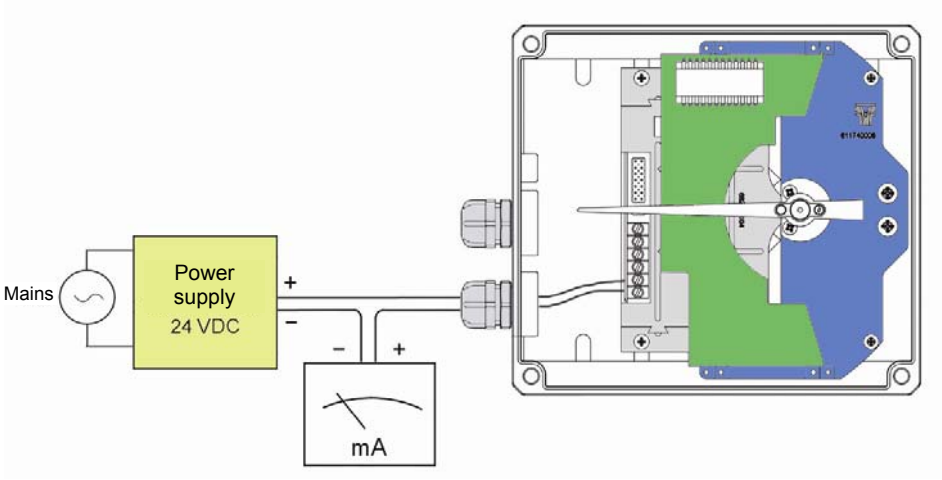
The instrument has a jumper that can be used to avoid changes in the configuration. When the jumper is connected the instrument can be configured via HART ™. When the jumper is removed, "Write Protect" is activated for HART ™, thus avoiding any changes in the configuration.

7 MAINTENANCE

No special maintenance is required.

8 4 WIRE CONNECTION

If Direct Current power supply for the transmitter is not available in the installation, it will be necessary to incorporate an additional power supply as in the following figure.



9 LP SERIES

Since LP series are level measuring instruments, they will be available only with TH5 and TH5H models.
For HART ™ communication, the measuring units of the primary variable (PV) will be a percentage (%), and the value of this variable will indicate the percentage of level respect to the instrument scale.

10 TECHNICAL CHARACTERISTICS

10.1 Power supply

2 wire.

Minimum voltage (TH5 y TH5T):	0.02 Z + 12 (Volt) (Z is the load in the current loop in Ohm). The minimum value is 12 VDC for Z=0 Ohm.
Minimum voltage (TH5H y TH5TH):	0..02 (Z+Rext) + 14 (Volt) (Z is the load in the current loop in Ohm). The minimum value is 18 VDC for Z=0 Ohm and Rext=200 Ohm.
Maximum voltage:	36 VDC (for the Ex version see point 11.3)
Consumption:	maximum 20 mA

10.2 Outputs

Analog output:	4 - 20 mA, factory calibrated
Maximum load in the 4-20 loop:	1,1 kΩ (at 36 VDC supply voltage) (for Ex version see point 11.3)
Pulse output:	MOSFET N channel potential free I_{max}: 200 mA

Maximum frequency:	2 Hz.
Pulse duration:	Aprox. 250 ms.
Totalizer:	8 digits. (7 + one decimal. Reset by means of potential free contact).

10.3 General characteristics

Housing ingress protection:	IP65
Cable gland:	PG11 or M16
Ambient temperature:	-5 - +70 ºC (for Ex version see point 11.3)
Precision (analog output respect the magnetic field):	< 0.6 %

10.4 Safety characteristics

This material conforms with the following directives:

2004/108/EC Electromagnetic Compatibility.

2002/96/EC Waste electrical and electronic equipment.

11 ADDITIONAL INSTRUCTIONS FOR THE ATEX VERSION

This chapter only applies to equipment intended for use in explosive atmospheres.

These equipment conform with the directive 94/9/CE (Equipment and protective systems intended for use in potentially explosive atmospheres) as is indicated in the EC-type examination certificate LOM 09ATEX2087 X and in its marking.

Given that this instrument is group II, it is intended for use in places likely to become endangered by explosive atmospheres, but not in mines.

The category is 1GD, that is, it is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or dust are present continuously, for long periods or frequently.

11.1 Non metallic parts

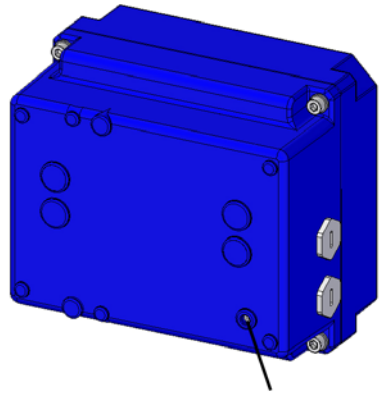
WARNING: POTENTIAL RISK OF ELECTROSTATIC CHARGE.

The front of the apparatus consists of a transparent plastic window in order to let the user see the position of the pointer on the scale.

Since the danger of ignition by electrostatic discharge when rubbing this window can not be avoided, the instrument must always be cleaned with a damp cloth.

11.2 Facilities connecting conductive parts to earth

When the instrument is not grounded securely through the connection process, it should be grounded through the housing screw, as shown in the figure.



11.3 Technical characteristics of the Exi version

Maximum voltage:	30 VDC
Maximum load in the 4-20 loop:	900 Ω (at 30 VDC supply voltage)
Ambient temperature:	-5 - +40 ºC
Pulse output:	Not available in this version.

The rest of characteristics are the same as in the point 10.

11.4 Marking

A drawing of the marking . For example, for a DP65.

The marking of the equipment shows the following characteristics:

- Manufacturer
- Model
- Serial number (year of construction and number)
- CE marking
- ATEX marking
- Certification number
- Address of the manufacturer

11.5 Exi parameters

Marking	Ex ia IIC T4	Ex ia IIC T6
Specific parameters	Ui : 30 V Ii : 165 mA Pi : 1,3 W Ci : 57,3 nF	Ui : 30 V Ii : 165 mA Pi : 1,3 W Ci : 57,3 nF

12 TROUBLESHOOTING

Problem	**Probable cause**	**Remedy**
The analog output gives always 0 mA	Cables disconnected.	Check the cable connection.
The pointer rubs on the scale	Normally occurs from a blow or fall of the instrument.	Straighten the pointer by bending it gently until separate it 2-3 mm from the scale surface.
When the float is moved the pointer follow it, but does not return to 0	The pointer is not properly secured to the shaft.	Set the pointer on the conical shaft through a soft and careful blow.
The pointer is displaced with respect to the zero of the scale.	Blow or fall of the instrument.	Match the pointer to the 0 of the scale by means of the adjustment screw of the pointer, turning left or right according to convenience. Hold the shaft in such a way that is not bent or damaged.

Note: To remove the cover, it is necessary to remove the four screws "allen" M5 + plastic washers in the back of the housing.

In all cases, check that there is no friction between the movement of the needle and the connecting cables of the limit switches or transmitters.

When the pointer of the instrument is handled, it can become in a loss of accuracy of the transmitter.

WARRANTY

Tecfluid S.A. GUARANTEES ALL ITS PRODUCTS FOR A PERIOD OF 24 MONTHS, after consignment, against all defects in materials and workmanship.

This warranty does not cover failures which can be imputed to misuse, use in an application different to that specified in the order, the result of service or modification by un-authorized persons, bad handling or accident.

This warranty is limited to cover the repair or replacement defective parts which have not been damaged by misuse.

This warranty is limited to the repair of the equipment and all further and eventually following damages are not covered by this warranty.

Any consignment of equipment to our factory or distributor must be previously authorised. The consignment should be done with the equipment well packed, clean of any liquids, grease or hazardous materials.
Together with the equipment, a note should be enclosed indicating the failure observed, the name, address and telephone number of the sender.

SHIPPING

In the event of damages during shipping, claim directly to the carrier over a period of less than 24 hours. Tecfluid is not responsible for any damage caused during the shipment of material.

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