



- Power Instrumentation, LCR analysis
- Gain Phase Analysis, PAV
- Shunts, clamp-on current transformers

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## Instructions and installation for the CTH sum dc current transducers Ver1.1

### Introduction

The CTH dc summation transducers can produce a 4-20mA current loop or 0-10V voltage output to represent the summation of its inputs. The number of inputs, input V, output mA or output V are indicated on the transducer label.

### Scaling examples with 0-10V inputs

Using a CTHsum/3x10V/10V/24Vdc = a 0-10Vdc output will be produced for 3 x 10V inputs.

To calculate sum output =  $(V1 + V2 + V3) / 30 \times 10V$  i.e. for 2 x 10V inputs present the output is 6.667V, for 1 x 10V input present, the output is 3.333V. Any input not used should be connected to 0V, remember this will change the scaling.

### Scaling 3 x 4-20mA inputs to 0-10V output

Using a CTHsum/3x4-20/10/24Vdc = a 0-10V output will be produced for 3 x 4-20mA inputs i.e. when all 3 inputs are 20mA, the output is 10V, when all 3 inputs are 4mA, the output is 0V, when all three inputs are 12mA (=50% range), the output is 0-5V and so on.

### Examples

All inputs 20mA = 10V

All inputs 16mA = 7.5V

All inputs 12mA = 5V

All inputs 8mA = 2.5V

All inputs 4mA = 0V

$(\text{Input 1} - 4\text{mA}) + (\text{Input 2} - 4\text{mA}) + (\text{Input 3} - 4\text{mA}) / 48 \times \text{Full scale output V}$

20mA all inputs

i.e  $(20-4) + (20-4) + (20-4) / 48 \times 10 = 10V$

12mA all inputs

i.e  $(12-4) + (12-4) + (12-4) / 48 \times 10 = 5V$

4mA all inputs

i.e  $(4-4) + (4-4) + (4-4) / 48 \times 10 = 0V$

### Example Scaling 5 x 4-20mA inputs and 4-20mA output

Using a CTHsum/5/4-20/4-20/24Vdc = a 4-20mA output will be produced for 5 x 4-20mA inputs i.e. when all 5 inputs are 20mA, the output is 20mA, when all 5 inputs are 4mA, the output is 4mA.

To calculate the 4-20mA sum output  $(i/p 1 \text{ mA} + i/p 2 \text{ mA} + i/p 3 \text{ mA} + i/p 4 \text{ mA} + i/p 5 \text{ mA} / 80) \times 16 = \text{output mA}$

### Example Scaling 4 x 4-20mA inputs and 4-20mA output

Using a ATHsum/4x4-20/ISO/4-20/24Vdc = a 4-20mA output will be produced for 4 x 4-20mA inputs i.e. when all 4 inputs are 20mA, the output is 20mA, when all 4 inputs are 4mA, the output is 4mA.

To calculate the 4-20mA sum output  $(i/p 1 \text{ mA} + i/p 2 \text{ mA} + i/p 3 \text{ mA} + i/p 4 \text{ mA} / 64) \times 16 = \text{output mA}$

To calculate the 4-20mA sum output with  $(i/p 1: 12\text{mA} + i/p 2: 12\text{mA} + i/p 3: 12\text{mA} + i/p 4: 12\text{mA}) / 64) \times 16 = 12\text{mA output}$

## **Installation and safety**

The CTH sum transducer should only be used in dry indoor environments. To prevent damage, check for correct connection of sum inputs, power input and measurement output. Installation should be carried out by authorized personnel, familiar with the danger of electric shock hazards. Allow a minimum warm up period of 10 minutes. If an external dc offset control is fitted, ensure that the CTH output = 0V or 4mA with zero applied to the inputs. The CTHsum inputs and outputs share common grounds, the CTHsum/ISO model indicates the inputs and outputs are isolated to 500V.

## **CTH summation module specification**

Recommended Measurement range is  $\pm 5\%$  to 100% range for voltage input versions

Input impedance is 330kohm for voltage inputs

Recommended measurement range is 4–20mA or 4-12-20mA for current loop input versions or 0-10V for voltage input versions

Input impedance for each mA current loop input is 51ohm

The output load impedance for a 10Vdc output should be  $>10\text{kohms}$ .

The output load impedance for a 4-20mA output should be  $<500\text{ohms}$ .

Accuracy is  $\pm 1\%$  over the temperature range  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Standard 24Vdc power input is 9-36Vdc

125Vdc power input, voltage range is 100Vdc to 150Vdc, max current draw 15mA

48Vdc power input, voltage range is 36Vdc to 72Vdc, max current draw 20mA

24Vdc power input, voltage range is 18Vdc to 36Vdc, max current draw 35mA

12Vdc power input, voltage range is 9Vdc to 18Vdc, max current draw 60mA

5Vdc power input, voltage range is 4.5Vdc to 6Vdc, max current draw 150mA

## **Connections and installation**

Screw terminals are provided for the power input and output connections. The terminal block connections are labeled. Ensure correct polarity for both input and power connections

## **Protection**

Accidental connection of input/output terminals to either a dc or ac voltage source  $>25\text{V}$ , may result in damage.

Internal fast acting fuses and/or diode protect the auxiliary power supply input and measurement output

Maximum isolation between power input terminals and input/output terminals is 500Vdc.

## **Gain and Offset adjust and calibration**

The CTHsum are supplied calibrated. Internal adjustment of dc offset drift (VR1) and gain (VR2) is possible, this should be made using the correct calibration procedure. Although yearly calibration adjustment is not required, it is recommended that periodical comparisons are made to known calibration standards.