OPERATING INSTRUCTIONS

COMPACT TRANSDUCER AMPLIFIER CTA 342

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NOT FOR HUMAN USE

HUGO SACHS ELEKTRONIK - Harvard Apparatus GmbH D-79232 March-Hugstetten / Germany
Tel.:(+49)(0)7665-9200-0 - Fax.:-90 - E-mail: sales@hugo-sachs.de - Internet: http://www.hugo-sachs.de

Contents

1. Introduction, manufacturer's details

These Operating Instructions describe the function and use of the Compact Transducer Amplifier CTA Type 342.

All the information in these Instructions have been drawn up after careful examination but does not represent a warranty of product properties. Alterations in line with technical progress are reserved.

Manufacturer's address:

HUGO SACHS ELEKTRONIK-
HARVARD APPARATUS GmbH
Gruenstrasse 1,
79232 March-Hugstetten
Germany

Phone: 07665/9200-0
(int +49) 7665/9200-0

Fax: 07665/9200-90
(int +49) 7665-9200-90

eMail: sales@hugo-sachs.de

Internet: www.hugo-sachs.de or www.harvardappartus.com

1.1 Copyright

2. Safety notes

Warning:

- Be careful in working with aerosols, gases and gas mixtures. DANGER !
- The Compact Transducer Amplifier CTA is designed for use in general laboratories, light industrial and office environments.

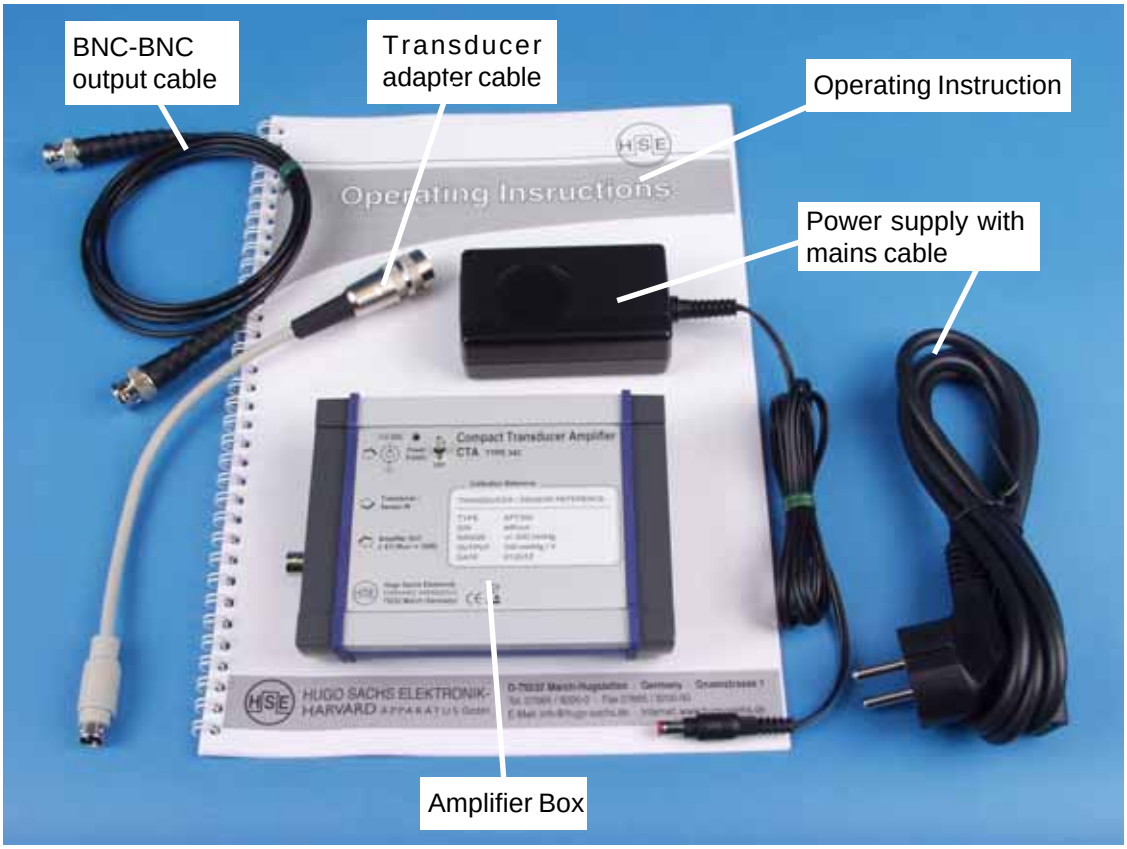
3. General description, application

The Compact Transducer Amplifier CTA (named CTA later in that manual) has been developed as a signal conditioner for single transducers based on a DC-Wheaston bridge. Many experiments where only one pressure or force transducer is used to record a signal, do not require the use of mainframe systems including severale modules. Also the use of Data acquisition systems where signals and evaluated parameters are displayed on the PC screen makes displays on amplifiers absolete.
There is therefore only the need to supply the transducer with power and to measure and amplify the signal to get the signal voltage in the range of the Data Acquisition Input Hardware.

The CTA can of course also be used as a preamplifier for any other system requiring the input of an analog signal in a certain range e.g the Harvard pressure controlled syringe pump.

4. Deliverables

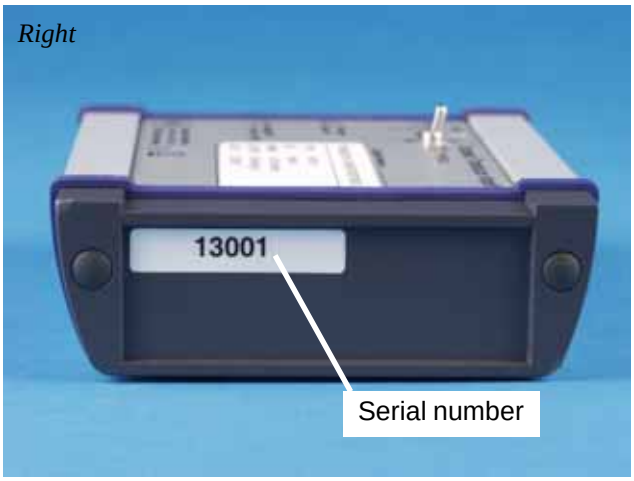
The delivery consits of:
- The amplifier box
- The power supply with the country adapted mains cable
- The transducer adapter cable (Standard is for transducers with HSE plug others are available and must be ordered separately)
- One BNC-BNC output cable (length 2 m)
- The Operating instructions



4. Technical description

The main amplifier is a flat low profile aluminium box. All the connections for power supply, transducer and output are on the side panels of the box.

Top view Frontpanel



View on Side Panels

4.1 Front panel

First of all you find on the frontpanel a **label** with the information on the calibrated transducer. When ever you change the transducer it'll require a recalibration (See description later in the manual). Also if you change for any reason the sensitivity (output range) of the currently calibrated transducer (See also later in the manual), we highly recommend to update the label. There are five blank labels attached to the manual.

The label carries the following information:

- Type of transducer (pressure, isometric force...)
- Serial number of the Transducer or any other identification information
- The measurement range of the transducer (e.g. +/- 300mmHg or +/- 1000mg...)
- Output sensitivity depending on calibration (e.g. 100mmHg/V) knowing that the maximum output voltage is +/- 4 Volt
- Date of the calibration

On the frontpanel, there is also a **power supply LED**. This LED is on whenever the power supply is connected and connect to mains and the ON/OFF switch located nearby is in ON position. It informs about a functioning power supply.

The **ON/OFF switch** allows in position OFF to interrupt the supply of the electronic amplifier circuitry and of the transducer.
If it was switched off and gets switched on, we recommend to wait a few minutes (5-10) before measurement. Some of the transducers may require a thermal stabilisation phase.

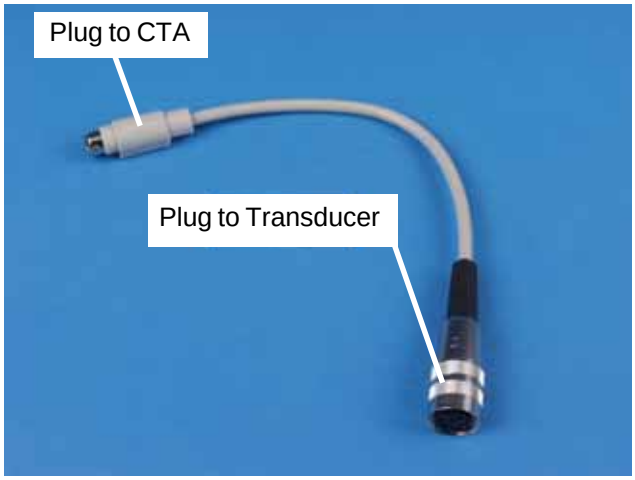
4.2 Right side panel

The right side panel carries only the label with the serial number of the CTA

4.3 Left side panel

The left side panel carries all the electrical connections for the power supply, the transducer and the analog output. There are also two trimmers for the adaptation in case of replacement of the transducer.

4.4 Transducer adapter cable

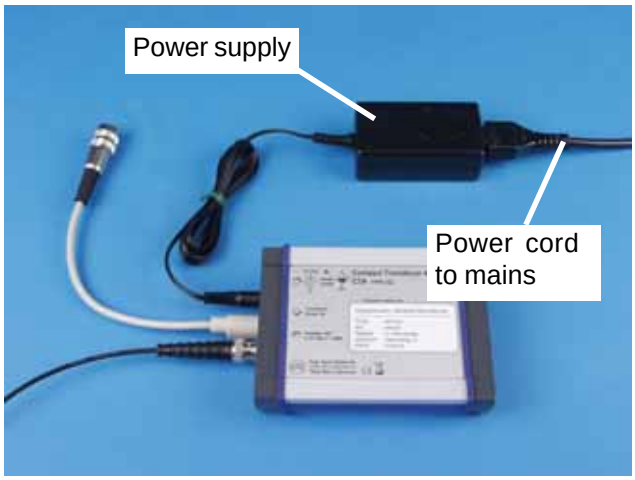


The transducer adapter cable is available in several versions depending on the plug mounted on the transducer. The standard cable is for the HSE transducers. It allows to connect any type of transducer based on resistive DC-Wheastone-Bridge to be connected on the CTA.

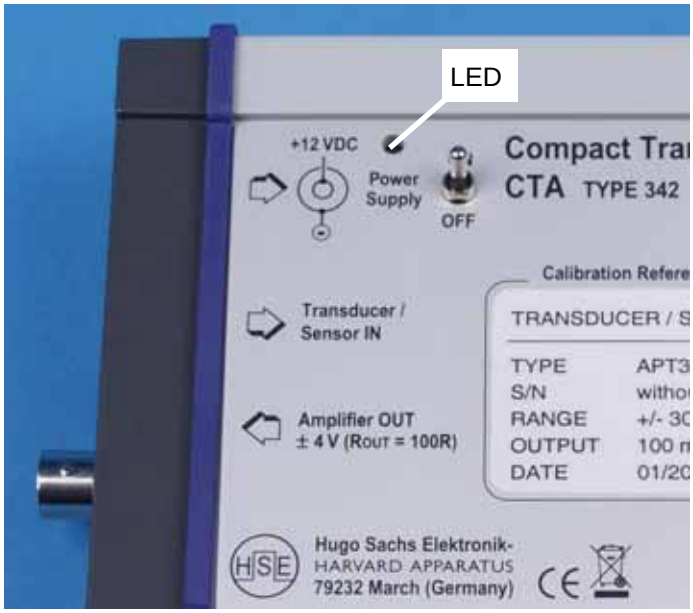
6. Assembling the measurement system

6.1 Connecting the power supply

The unit is delivered disassembled. The power supply must be connected to the main unit and to mains.



First connect the power supply to the CTA and than to the mains. We supply the power cord according to your country mains power sockets. If you change country or if the power socket have been changed without our knowledege, you may require a different power cable. You can contact us we have most of them on stock.

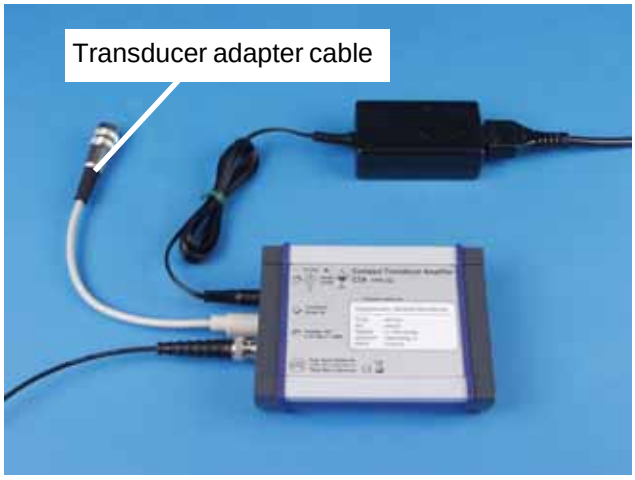


When the power supply is connected to the CTA, as well as the power cord to mains socket and the switch nearby in "ON" position the LED "Power Supply" on the front panel lights up.
I shows that the power supply is working.

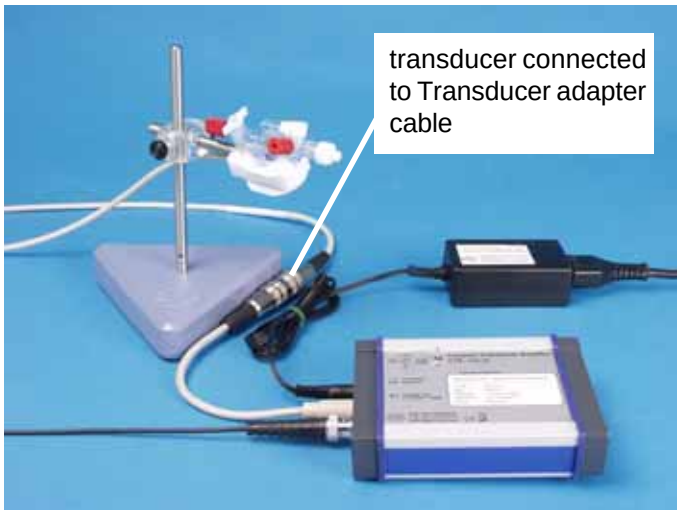
6.2 Connection of the Transducer

The transducer is not connected directly to the CTA but via the transducer adapter cable.
The unit comes with the standard cable for the HSE transducers.
If the unit is delivered with a transducer, the CTA is calibrated, ready to use, we record type of transducer, serial number, range, output voltage and date of calibration in the label field of the front panel.
If you want to use a different transducer you must recalibrate it and change the label on the front panel (See the procedure later in the manual). At the end of the manual there is also a list of the different plugs depending on the transducer supplier. If you require an adapted transducer cable check on the list for the right supplier and connector.

First connect the transducer cable to the CTA



Then connect the transducer to the transducer cable (See figure below with an HSE pressure transducer APT300 connected)



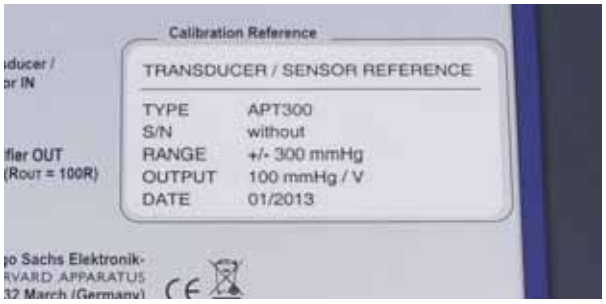
6.3 Connection of the analog output

The analog output can be connected to any recording system like an oscilloscope, a digital voltmeter or a Data Acquisition System.
A BNC-BNC cable is delivered with the unit, most of the recording devices have a BNC input socket.

7. How to use it

After all connections are realized, the main unit is switched on. The "ON" switch is located on the front panel next to the power supply indicator light. As some transducer require time to warm up and get stable it is recommended to wait about 5 minutes before using the unit for calibration and measurement.

7.1 Calibration of the recording system



The recording system can be either a standard measurement unit like an oscilloscope, a digital voltmeter or a data acquisition system.
The CTA is delivered with your selection of transducer and is factory calibrated. The calibration value can be read from the label on the front panel.
The calibration is named "OUTPUT" and is expressed in the unit of the transducer per 1 Volt signal at the analog output. On the figure left, the tranducer is a blood pressure transducer. The "OUTPUT" is defined as 100mmHg/V. That means 1 Volt at the analog output represents 100 mmHg. If you have a digital voltmeter or an oscilloscope connected at the analog output and you read 2.5 volt, the pressure applied to the pressure transducer ist 250 mmHg. As the analog output has a voltage range of +/- 4 volt, it would allow measurements going from -400 to +400 mmHg. It is also important to view the "RANGE" indication. In our case the range is +/- 300 mmHg. That means the transducer itself has a measuring range of +/- 300 mmHg even if the CTA could accept +/- 400 mmHg.

If a data acquisition system is used, the calibration range can be entered as being (in our case) 0 volt for 0 mmHg and 1 volt for 100 mmHg.
If the data acquisition system requires to read in a calibration signal, you first have the pressure transducer open to ambient air and read in the 0 mmHg value as the first calibration point. Following that apply a pressure on the pressure transducer using a pressure calibrator and read in the equivalent signal for the second calibration point.

7.2 Changing transducer and recalibrating

If the CTA was ordered with a transducer it comes factory calibrated. The CTA is factory setup for standard pressure transducers (optimal settings for the Gain). If a different transducer must be connected it requires calibration.
First be sure the transducer connector fits to the transducer cable, if not change the connector on the transducer or order the adapted transducer adapter cable from HSE.
Most of the transducer work with an excitation voltage of 5 volt, just check if that is true for the transducer you want to connect.
Remove the calibration reference label from the front panel and have a blank one ready, prepared to record all the information on the new transducer (there are some attached on the manual).

The CTA supplies the transducer with a fixed excitation voltage of 5 volt and has an adjustable gain in the range of x396 to x484.

Before you try to adjust a new transducer you must check if the gain range allows you to use the tranducer and CTA combination in the measuring range you expect (see following sheet).

Type of HSE Transducer	Signal	Unit	Minimum Range	Maximum Range	suitable
APT300	Arterial Blood Pressure	mmHg	331	404	*
P75	Venous Blood Pressure	mmHg	1,65	2,02	
DLP2.5	Low Differential Pressure (Pneumotach)	cmH2O	0,025	0,031	
MPX100	Tracheal or Esophageal Pressure	cmH2O	3,3	4,0	
Flow/Pressure Head	Rat				
	Air Flow	ml/sec	194	238	
	Tracheal Pressure	cmH2O	83	101	!
Flow/Pressure Head	Mouse				
	Air Flow	ml/sec	75	92	
	Tracheal Pressure	cmH2O	83	101	!
F30	Force Transducer	g	3,3	4,0	!
K30	Force Transducer	g	17	20	!

*suitable
! not optimal but can be used

For the transducer with "*" (APT300) the CTA is best adapted. For the transducers marked "!" they may be used in this configuration, but adapting it to the transducer would make much more sense. For the transducers having no mark the CTA must definitely be adapted.
Adaptation requires a modification of a resistor inside the CTA and must be done at factory.

7.3 Transducer recalibration

For the calibration of a every new transducer two steps are required. Calibration of the low value (zero value) and calibration of the high value, a value close to the expected working measurement value. For these calibrations there are two trimmers located on the left side panel. The use of a digital voltmeter is higly recommended

7.3.1 Low value calibration

Connect the digital voltmeter or multimeter (in mode DC voltage measurement) to the analog output of the CTA. Connect the Transducer using the corresponding transducer adapter cable and be sure the CTA is powered (check the LED on the front panel as well as the "ON" switch.
Check the transducer to be in a non loaded and working position situation, in case of a pressure tranducer be sure it is open to atmospheric pressure, in case of a force transducer that there is no load on, in case of a flow transducer that there is flow 0...
Wait a few minutes to let the transducer stabilize.

Using a small screwdriver adjust the "LOW" trimmer so the voltmeter connected at the analog output reads 0.00 Volt.

7.3.2 High value calibration

Now load the transducer with a load being close to the expected measurement value e.g. 100 mmHg for a blood pressure transducer, or 0,01 N for a force transducer.
Wait a few seconds for stability.
Adjust the voltage on the voltmeter using the screwdriver on the "HIGH" trimmer.
How to define that voltage ?
The maximum output voltage for the CTA is 4.00 Volt. The high calibration voltage should be set such as the maximum value we may measure will not result in an output voltage of more than 4.00 Volt.

Example:
We want to calibrate a blood pressure transducer. With a pressure calibrator we apply a calibration pressure of 100 mmHg to the pressure transducer (mean expected values during the experiment are in the range of 80-120 mmHg).

- The maximum pressure we want to be able to measure is 300 mmHg.
  We set the "HIGH" trimmer to read 1.3 Volt for the applied 100 mmHg, so when the output voltage is 4.00 Volt the pressure on the transducer is 300 mmHg, the maximum we want to measure.

- The maximum pressure we want to be able to measure is 400 mmHg.
  We set the "HIGH" trimmer to read 1.00 Volt for the applied 100 mmHg, so when the output voltage is 4.00 Volt the pressure on the transducer is 200 mmHg, the maximum we want to measure.

8. Cleaning the apparatus

To clean the CTA we recommend to use a moist towel. Take care on all connectors and switches. All these parts should remain dry.
Do not use any corrosive agent.

9. Maintenance and servicing

There is no special maintenance or service required. The CTA may be returned to the factory if a special transducer requires adaptation.

10. Faults, causes and remedies

There is presently nothing reported

11. Technical caracteristics

- Frequency response of the CTA DC - 500 Hz
- Transducer excitation voltage 5 Volt, Ri=10 Ohm
- Gain factory adapted to the transducer see measurement range on the label on the front panel.
- Power supply by external power module Input voltage 100-240 volt 50-60 Hz, output voltage 12 volt DC
- Power consumption 100 mA max.

12. Reply Form

Please take a few minutes of your time in order to write to us on any difficulties in understanding the Operating Instructions or in the use of the apparatus. With your feedback you will help to improve our products and the system documentation and make them more user-friendly.

Please tell us

- ☞ where you have found mistakes,
- ☞ where the arrangement was not clear and what you did not understand,
- ☞ and where you would like to see improvements.

Many thanks for your *kind assistance.*
Yours HUGO SACHS ELEKTRONIK-
HARVARD APPARATUS GmbH.

Your name _____

Organisation _____

Street _____

Town _____

Phone / Fax _____

eMail _____

Please send this sheet or a copy to:

HUGO SACHS ELEKTRONIK - HARVARD APPARATUS GmbH
Gruenstr. 1, D-79232 March-Hugstetten, Germany
Fax (int. +49) 7665/9200-90