MiniCTA and Multichannel CTA Systems

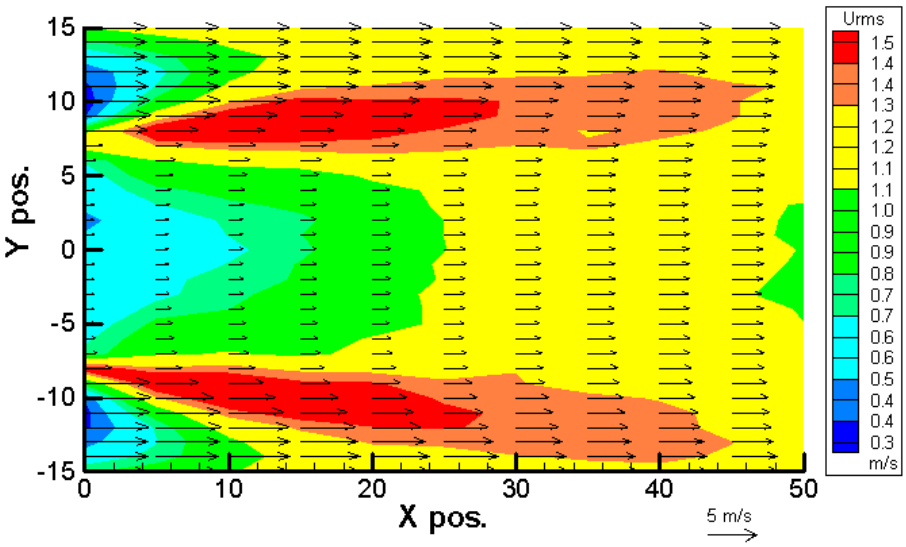
CTA Systems for Fast and Accurate Flow Investigations

Applications

- Flow velocity and turbulence measurements.
- For applications in air (> 100 m/s) and in water.
- Educational, industrial and scientific applications.
- Can be used with both wire and fiber/film probes depending on application.
- Multipoint measurements in e.g. boundary layer studies or in studies of coherent structures.

Features

- Bandwidth ~10 kHz for wire probes in air.
- Up to 20 m cables can be used.
- Easy to learn software - one click acquisition, probe traversing and data conversion into velocity components, and data reduction.
- Fast velocity calibration of single or multiple probes, including a certified Calibration System for ensuring high accuracy.



Introduction

The MiniCTA and its Multi-Channel versions offer a solution for measurement of flow and turbulence in many applications with low to medium flow velocities and moderate fluctuation frequencies. The MiniCTA systems are ideal for both newcomers and more experienced users. The CTA units are also well suited for practical demonstrations in educational fluid dynamics.
Supporting a wide range of CTA probes the new MiniCTA is the perfect tool for simple and accurate measurements in both air- and water applications.

Description

MiniCTA is a single channel anemometer optimized for use with wire probes in air. Velocities above 100 m/s in air can be measured. The bandwidth reach above 10 kHz at 50 m/s in air. The unit can be adjusted for use with probes suited for water applications.
The Multi-Channel versions of the MiniCTA offer a cost efficient solution for multi-point measurements. MiniCTA software provides easy-to-learn tool to perform reliable velocity and turbulence measurements.

DANTEC DYNAMICS

NOVA INSTRUMENTS

Hardware specifications

The new MiniCTA Anemometer is based on a modern circuit board design. The anemometer comes with a robust metal cabinet and is delivered with a power supply but can also be run on batteries. Major features include: an adjustable resistance range of 4-36 Ohms - to allow for the use of a large range of wire and fiber/film probes - and a cable compensation circuit to allow for use of cable lengths up to 20 m. For use with wire probes in air the bandwidth reaches above 10 kHz at 50 m/s.

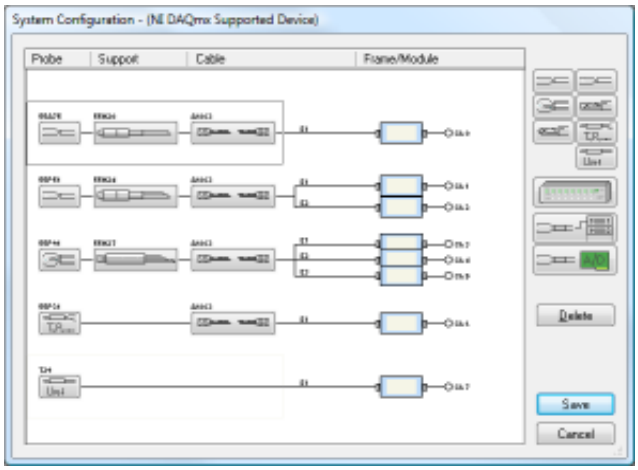
The Multichannel CTA units are based on the same circuit board as the MiniCTA - and up to 8 CTA channels are available in one unit. If required two units can be combined to build a 16 channels system.

A MiniCTA package is also available which includes one MiniCTA with power supply, two probes with built-in probe supports and the MiniCTA software.

Database Manager

The MiniCTA software centers on the Database Manager, which keeps track of events created in the software: including Hardware Configuration, MiniCTA Setup like overheat ratio and reference temperature, Calibrations, Acquired and Converted/Reduced Data, Traverse Grids, Probe Arrays etc. Both acquired and reduced data are saved in the database, thus eliminating complicated file handling, and ensuring full traceability.

System Configuration



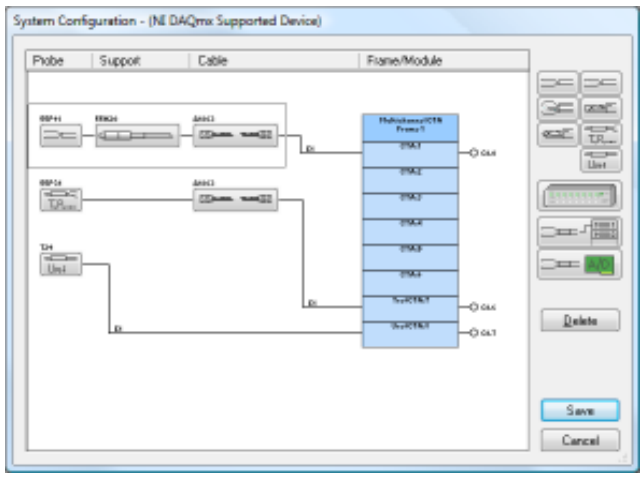
The System Configuration visually shows the connections to the MiniCTA Anemometers.

The System Configuration defines the interconnection between probes, supports, cables, the MiniCTA Anemometers, and how they are connected to the input channels on the AD device.

The probes are selected from the Probe Library, which contains recommended setup data for the full range of Dantec Dynamics standard Wire, Fiber and Film probes.

Special probes like reference temperature and velocity probes are also included along with the possibility to define custom made probes.

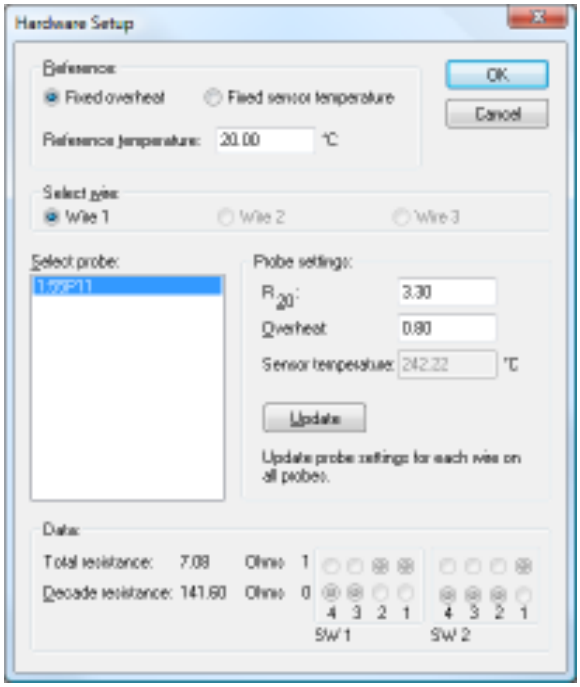
The MiniCTA software fully supports the Multichannel CTA systems, providing an easy way of connecting the probes to the Multichannel CTA Frame.



System Configuration with Multichannel CTA Frame, including temperature and velocity reference probes.

Hardware Setup

The MiniCTA Hardware Setup is based on input of probe cold-resistance, reference temperature and overheat ratio from the Probe Library. The software automatically calculates the dip-switch settings of the MiniCTA, defining the corresponding (hot-resistance) decade setting, based on fixed overheat or sensor temperature. The dip-switches are located on the circuit-board inside the MiniCTA / Multichannel CTA cabinet.



The Hardware Setup automatically calculates and displays the dip-switch settings for the MiniCTA.

Velocity Calibration, Probe Calibration

The MiniCTA software supports velocity calibration in combination with an external velocity reference e.g. in a wind tunnel. From related values of velocity and anemometer voltage it forms a transfer function (polynomial, power law or table lookup) to be used for converting measured voltages into velocities.

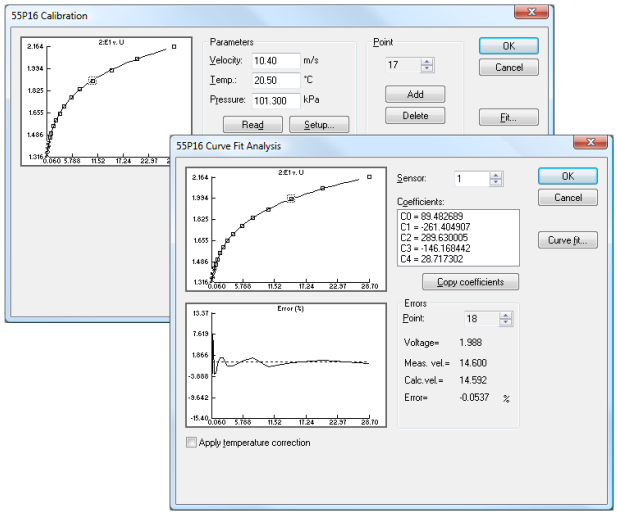
When probes are calibrated in a wind tunnel, the 54T29 Velocity reference transducer offers an alternative to e.g. a Pitot tube, especially at low velocities. The reference transducer is delivered with calibration data from 0.2 to 30 m/s, to be pasted into the probe library ready for use by the calibration routine.

The Multichannel Add-on extends the velocity calibration to allow all probes in the configuration to be calibrated simultaneously.

Hot-Wire Calibration

In combination with the Dantec Dynamics hot-wire calibrator, the MiniCTA software provides accurate and fast calibration of probes using a unicurve approach.

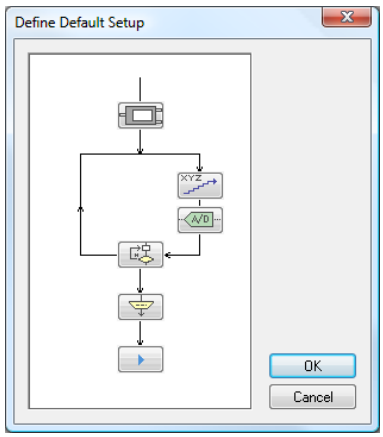
All calibration routines include advanced fitting and error analysis to improve the accuracy of the measurements.



Online calibration results and curve fit analysis.

Defining and Running Default Setup

Measurements are defined as a chain of events comprising: probe traversing, data acquisition, scheduling and data conversion/reduction. Once defined the events can be called and started at any time from the Project manager.



The Default Setup interactively displays the sequence of a MiniCTA measurement. Each step will automatically use the predefined default events.

Traversing

The software supports both automatic and manual control of a traversing system. A number of pre-implemented drivers for commonly used industrial traverse systems are included: Lightweight isel®, Dantec 57G15, Low-Noise JVL, Newport, Thorlabs and more.

Traverse Grid

A Traverse Grid can be defined as an event in the database, covering the interrogation area of interest. The grid defines the probe positions and the traverse

movement by specifying a x, y, z positions plus an optional rotation.

Probe Array

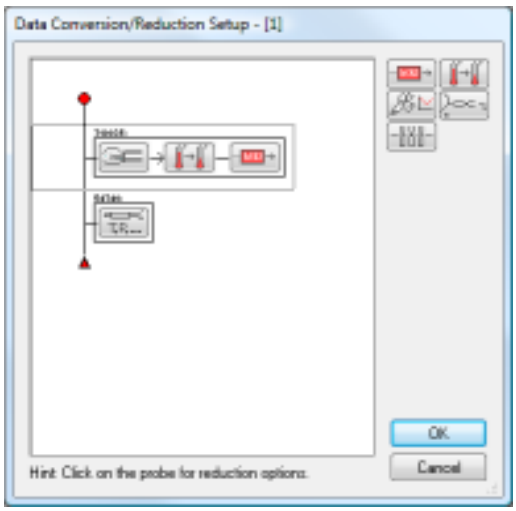
As part of the Multichannel Add-on the probes may be traversed in a fixed array of multiple probes. The Probe Array is defined and saved as a reusable event similarly to a Traverse Grid.

Data Acquisition

Probe signals are acquired and saved using an AD Device connected to the measurement PC.

MiniCTA supports the National Instruments® DAQmx driver standard. This ensures that all current and future devices supported by DAQmx are and will be supported by the software. This flexible design guaranties that MiniCTA will run with the latest PCI, PXI, FireWire or USB AD Devices from National Instruments. A number of legacy AD drivers are also included in the software. By using the Programmers Toolkit AD drivers can be custom made.

Data Conversion and Reduction



MiniCTA offers a visual way of presenting complex relationships between data acquisition, linearization and conversion/reduction for multiple probes.

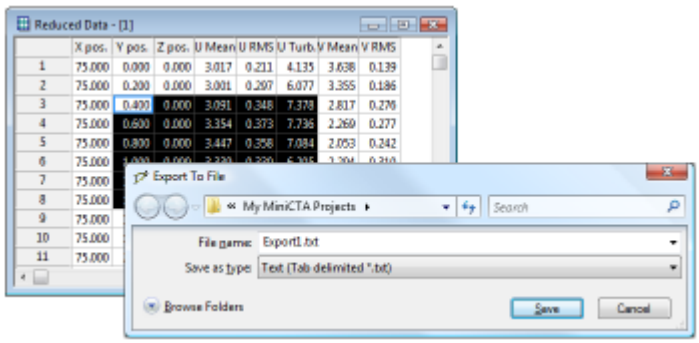
Measured data is converted into velocity components and reduced in the amplitude and/or time domain (moments, statistics, correlations and spectra). If temperature is acquired together with velocity, the probe voltages can be automatically corrected for changes in ambient temperature. Conversion and reduction are defined in the database as reusable events independent of the data acquisition.

Measured data from multiple probes can be reduced simultaneously by a single keystroke using the Multichannel CTA Add-on. They are saved both as individual events for each probe and as one merged event.

Data Presentation and Export

Data can be presented in data sheets and in graphs as time series or profiles. The presentation of the data can be adjusted to fit nearly any needs.

Measured and reduced data can be exported or copied to other programs (Excel®, MATLAB®, Tecplot™ etc.) for further processing and presentation.



Numerical data can directly be exported from the data sheets, and graphs can be saved as images.

Furthermore MiniCTA provides a unique global export feature for exporting all measurement settings and data into one file, for reporting and doumentation of the experiment.

Platform

MiniCTA fully utilizes the facilities and possibilities available in Microsoft Windows:

- The software is running on Windows 2000, XP, Vista 32/64 and Windows 7, using multitasking to enhance performance.
- The menus and toolbars are fully customizable, and dialogs and windows can be resized to improve the experience.
- The MiniCTA software is integrated with the look and feel of Windows themes and system settings.
- Intuitive context menus and guidelines for simplified operations.
- Online help is available and the software can be updated from the web.

Requirements

- PC with a modern multi-core processor and Windows 2000, XP, Vista 32/64 and Windows 7.
- Installation must be performed by an account with admin privileges, but program runs under limited privileges.
- National Instruments DAQmx compatible AD device.

Main specifications

MiniCTA and MultiChannel CTA	
Adjustable hot-resistance range	4 -36 Ohm (adjusted via dip-switches)
Probe cold resistance	Max. 20 Ohm (wire and fibre/film probes can be used after adjustment via dip-switches)
Allowed cable lengths	Max. 20 m (cable compensation setting via dip-switches)
Bandwidth (wire probe)	10 kHz (at 50 m/s)
Bridge ratio:	1:20
Output voltage	0.05 – 7 Volts
Maximum probe current (4 Ohm):	300 mA
Output low-pass filters (-3 dB):	1 kHz, 3 kHz, 10 kHz, OFF (approx. 50 kHz)
DC-offset:	0 Volt or 0.9-2.2 Volts adj.
DC-Gain:	1 or 2-5 (cont. adj.)
Power supply	Included (10.5 -14 VDC)
For both air (gases) and water applications	Yes

Ordering Information

Product No.	**Single channel CTA unit**
54T42	MiniCTA for wire- and fiber/film-probes
54T46	MiniCTA Anemometer package for wire- and film-probes (includes 54T42, two 55P16 wire-probes, software)
	Multichannel CTA units
54N80 (4-36 Ohm)	Frame with 8 MiniCTA channels
54N81 (4-36 Ohm)	Frame with 6 MiniCTA channels, 1 velocity reference channel (requires 54T29) and 1 temperature reference channel (Temperature probe included)
54N82 (4-36 Ohm)	Frame with 4 MiniCTA channel and two analog inputs (direct to A/D channels)
	Software
54S50	MiniCTA Software
54S56	Multichannel Add-on (software)[1]
46S26	Programmers Toolkit[2]
54S58	LabVIEW® Toolbox for MiniCTA
80S49	Data Loaders for Tecplot™
	A/D device
38A0261	For MiniCTA (max. 4 channels)
38A0262 +38A0266	For MultiChannel CTA (max. 16 channels)
	Calibration hardware
54T29	Velocity reference transducer, Pre-calibrated: range 0.2 -30 m/s Requires 54N81 or 54T95
54H10	Hot-wire Calibrator - fully supported in MiniCTA software

[1]The Multichannel CTA Add-on includes support for multichannel calibration, probe arrays, and multichannel data reduction and merging.

[2]To build support for OEM AD devices and traverse systems together with extended processing module through the Programmers Toolkit. Requires C++skills.

Additional Information

For additional information please contact your Dantec Dynamics representative in your country.
www.dantecdynamics.com.

The specifications in this document are subject to change without notice.

Publication No.: Pi_313_v2