CoCo-80X and CoCo-90X Software Specifications

- *Ideal for a wide range of industries including petrochemical, paper, steel and other metals, automotive, aviation, aerospace, electronics, and military.*
- *Rugged, lightweight, battery powered handheld system with unparalleled performance and accuracy.*
- *Features an intuitive user interface and patented technology.*
- *Supports multiple languages: English, Chinese, Japanese, French and Spanish.*

CoCo handheld dynamic signal analyzers & data collectors

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CoCo-80X

The CoCo-80X is a new generation of handheld data recorder, dynamic signal analyzer, and vibration data collector from Crystal Instruments. It is ideal for a wide range of industries including petrochemical, paper, steel and other metals, automotive, aviation, aerospace, electronics, and military. These industries demand quick, easy, and accurate data recording in addition to real-time processing in the field.

The CoCo-80X is a perfect machine condition monitoring solution. It is a rugged, lightweight, battery powered handheld system with unparalleled performance and accuracy. The intuitive user interface is specifically designed for easy operation while still providing a wide variety of analysis functions.

Software Installation and Upgrade

- **Software installation and Updates:** Download software updates directly to the device or download to a PC first.
- **Software Functions:** Controlled by the installed license key.
- **Measurement Projects:** Projects are created based on the concept of “Configurable Signal Analysis” (CSA). A few dozen typical CSA projects are pre-installed with each hardware device. Users can customize CSAs in the EDM CSA editor.

Touch Screen

- 7” color TFT WVGA display
- 800x480 resolution with P-Cap touch screen
- 1300 NITS

Connection Type

- **Ethernet:** Dynamic Host Configuration Protocol (DHCP) or static IP address setup may be used. Connect Ethernet directly (One-to-One) or via Local Area Network (LAN). Use of address mask, gateway, and Domain Name System (DNS) are supported.
- **Wi-Fi:** CoCo-80X is configured as a Wi-Fi router for direct communication with a PC tablet or phone. Dynamically enable/disable this Wi-Fi hotspot, with or without password connection.
- **USB:** PC recognizes the CoCo-80X as a USB storage device. Supports data transfer, but other EDM functions are not supported. This function requires Windows 7 or higher operating system.

Power Management

Intelligent power management controls the power consumption of the display LCD during measurement with preset timers. It manages the power-down based on residual battery power and heat conditions. Power status (including maximum capacity), current capacity and working temperature are displayed.

Calibration Tool

- **System Calibration:** Calibration Wizard guides the user through all necessary steps.
- **Calibration Report:** A final calibration report is generated. The report includes the model number, text for the calibration meter, and operator name. Users can view or print reports from the host PC.

CAN Bus

- **CAN Bus Input:** A dedicated 9-pin connector accepts serial digital data in accordance with ISO 11898-1 & 2.
- **CAN Bus Mode:** OBD-II Protocol or by DBC file
- **OBD-II Protocols:** ISO 15765-4 CAN (11 bit ID, 29 bit ID, 250 KBaud, and 500 Kbaud)
- **Baud Rate Setting (in bps):** 5k, 10k, 20k, 50k, 100k, 125k, 250k, 500k, 800k, 1M

Audio

Audio input and output are supported. The user can adjust the (stereo) earphone volume and customize various alarm sounds heard through them. Users can record voice annotations during data acquisition while viewing a voice volume indicator on the screen. The voice annotation is saved with the signals and can play back on a PC using the EDM software.

HDMI Interface

Users can view the CoCo-80X screen display on an external HDMI-compliant video monitor.

Miscellaneous

- **Date and Time:** User can set the date, time, and time zone.
- **Account Management:** Account management based on username and password is provided. Multiple user accounts are supported.
- **Language:** English, Chinese, Japanese, French and Spanish.
- **Number Digit Notation:** Choice of engineering notation, scientific notation or floating point notation.

Analog Input Settings

- **Sensitivity:** Specified in millivolt per engineering unit (mV/EU)
- **Input Mode:** DC-Differential, DC-Single End, AC-Differential, AC-Single-End, IEPE (ICP®)
- **Input Range:** 20 V*
- **High-Pass Filter:** 0.1 Hz to 100 Hz user-definable

- **Label:** Text identifier entered for each channel

** For CoCo-90X, the user must select an input range of 0.2 V, 2 V, or 20 V.*

Signal Source (Analog Output) Settings

Users can enable the signal source in all testing modes except Order Tracking.

- **Output Range:** ±10 V (programmable)
- **Source Waveforms:** Sine, Triangle, Square, White Noise, Pink Noise, DC, Chirp, Swept Sine, Arbitrary
- **Arbitrary Waveform Size Limit:** up to 128,000 points
- **Playback Recorded Signals:** Recorded signals can be played back from the output channel with voice annotations.

Recording Time Streams and Saving Data Block

Recording Time Streams

In all testing types, continuous time streams of enabled channels can record directly to a removable SD card.

- **Max Spectral Bandwidth During Recording:** 46.08 kHz (sampled at 102.4 kHz)
- **Data Recording Trigger Condition:** User initiated command. Set by Timer, Run Schedule, or Input Trigger.
- **Time Duration of Recording:**
  D = (1 sample/4 byte) * S/(C*$F_{sampling}$)
  - **C** Channel Count (#)
  - **$F_{sampling}$** Sampling Rate (samples/sec)
  - **D** Recording Duration (seconds)
  - **S** SD Card Storage (bytes)
- **Max Data Recording Rate:**

Sampling Rate	Max Channel Count (for recording)
102.4 kHz	8 channels
81.92 kHz	12 channels
64 kHz	15 channels
51.2 kHz	16 channels

Sampling Rate	Estimated recording time with 128 GB SD Card
16 channels @ 51.2 kHz	10.3 hours
8 channels @ 102.4 kHz	10 hours
4 channels @ 102.4 kHz	21 hours
4 channels @ 12.80 kHz	168 hours
1 channel @ 12.80 kHz	28 days

Standard Dynamic Signal Analysis (DSA) Functions (C80X-01, C90X-01)

The user has the option to operate the CoCo-80X in Dynamic Signal Analysis (DSA) or Vibration Data Collector (VDC) mode. This section specifies the basic software functions of DSA mode. The functions stated in this section are included in the delivery of 2, 4, 6 and 8 channel CoCo-80X configurations.

FFT Analyzer Functions

- **Transient Time Block Size:** Up to 65,536 points for 1 channel, up to 16,000 points for 8 channels.
- **FFT Block Sizes and Spectral Lines:**

Channels	Max. Block Size [Samples]	Max. FFT Lines
1	65,536	28,800
4	16,384	7,200
8	8,192	3,600
16	4,096	1,800

- **Window Functions:** Hanning, Hamming, Flattop, Uniform, Kaiser-Bessel, Blackman, Force, Exponential, Force-Exponential.
- **Averaging:** Exponential, Linear, Peak Hold, Time Exponential, Time Linear
- **Spectrum Types:** Linear Spectrum, Auto Power Spectrum, Frequency Response Function, Coherence, Cross Power Spectrum, and Phase Spectrum
- **Spectrum Units:** $EU_{pk\text{-}pk}$, EU_{pk}, EU_{rms}, EU_{rms}^2, EU^2/Hz, EU^2·s/Hz, degree (Phase)
- **Overlap Ratio:** 25%, 50%, or 75%, Maximum Possible Overlap
- **Correlation Functions:** Auto- and Cross-Correlation Functions
- **Linear Spectrum Scaling:** Peak or RMS
- **Power Spectrum/PSD:** RMS, Power, Power Spectral Density, Energy Spectral Density
- **Scaling:** Linear, dB, or Logarithmic
- **Acquisition Modes:** Free-Run or External Trigger

Zoom Spectrum Analysis

Zoom Spectrum Analysis provides very high-resolution spectra by concentrating the analysis upon a user-specified frequency range (f_{lower} to f_{upper}) within the DC-to-selected maximum frequency bandwidth.

- **Functions Computed:** Linear Spectra, Auto Power Spectra, Frequency Response Function, Coherence, and Phase.
- **Maximum Analysis Frequency:** 4 inputs: up to 4 kHz
- **Smallest ZOOM Bandwidth:** 0.28125 Hz

- **Maximum Zoom FFT Lines:** 1800 lines
- **Highest Theoretical Frequency Resolution:** 0.00015625 Hz
- **Acquisition Modes:** Free-Run or External Trigger

Double-Hit Detection and Auto-Rejection
Alerts the user of a double-hit. Auto-Rejection allows double-hit measurements to be automatically rejected.

Saving Signal Blocks
Signal Blocks are saved based on a list predefined by the user. Data is stored in .REC format.

Export Data File Formats
Signal blocks or recorded time streams can export via EDM to other data formats:

- **Data Formats:** ASAM-ODS XML, UFF ASCII, UFF Binary, ASCII, Excel CSV, MATLAB, WAV

Real-Time Digital Filters (C80X-19, C90X-19)
Real-time digital filters are CSA modules that are applied in the data conditioning phase. The user can cascade real-time filters or other data conditioning modules to construct powerful real-time analysis functions.

- **Filter Design Display (in EDM):** The user enters cut-off frequencies, criteria of attenuation, ripple, and filter orders; a preview of the filter curve is displayed as settings are updated.
- **Decimation Filter:** 2:1 decimation with built-in anti-aliasing filter. Anti-aliasing attenuation is greater than -80 dB, providing sufficient removal of high frequency noise. Decimation stages are selectable by the user; each stage decimates data by two, removing every other sample point.
- **FIR Filter Using Window Method:** FIR filter designed based on data window applied to the sine function.
  - **Data Window Types:** Hanning, Hamming, Flattop, Uniform, Kaiser-Bessel, and Blackman
  - **Filter Types:** Low-pass, High-pass, Band-pass, Band-stop Types
  - **FIR Taps:** 11 – 127
- **FIR Filter Using Remez Method:** The Remez FIR Filter module utilizes the Parks-McClellan algorithm to design and apply a linear-phase filter with an arbitrary multi-band magnitude response.
  - **Filter Types:** Low-pass, High-pass, Band-pass, Band-stop Types
  - **Filter Length:** 11 – 127
- **IIR Filters (3 types):**
  - **Filter Topography:** Butterworth, Chebyshev, and Elliptic
  - **Filter Types:** Low-pass, High-pass, Band-pass, Band-stop
  - **Filter Order:** 1 – 20

Histogram and Statistics Functions
The Histogram and Statistics function is a single processing module that is applicable to any Time Stream. The output of the module is a histogram signal and associated statistical results. The display format is selected on the CoCo-80X.

- **Histogram Parameters:** Number of Bins for the Bar Chart, Amplitude Ranges
- **Histogram Display View Mode:** Cumulative, Linear (Normalized or Non-normalized), Log (Normalized or Non-normalized)
- **Statistics Results:** Mean, Max, Min, Skewness, Variance, Crest Factor, Kurtosis

Optional Dynamic Signal Analysis Software Functions

The user has the option to operate the CoCo-80X in Dynamic Signal Analysis (DSA) or Vibration Data Collector (VDC) mode. This section specifies the optional software functions of DSA mode. All functions stated in this section are optional.

Order Tracking (C80X-11, C90X-11)

Developed to operate with a precise digital tachometer, the Order Tracking option uses high-speed digital resampling and proprietary DFT processing to acquire whole and fractional orders at a fast slew rate. Order Tracking can record Time Streams, real-time Order Tracks and Order Spectra, narrow- and fixed-band RPM Spectra, overall RPM Spectrum, and Order Tracks with Phase data.

Real-Time Order Tracks and Order Spectra
Real-Time Order Tracks are signals that present the signal amplitude of a specified Order graphed against RPM. Multiple Order Tracks are measured, displayed, and saved. Order Spectra are Auto Power Spectra with the horizontal axis normalized to orders.

- **Max Order Tracks:** 28 tracks with 1 channel; 8 tracks with 4 channels; 4 tracks with 8 channels
- **Max Order of Interest:** 200
- **Order Tracks Scaling:**
  - Linear Spectrum with Peak or RMS Scaling
  - Power Spectrum with RMS Scaling
- **Spectrum Units:** EU_{pk}, EU_{rms}, EU_{rms}^2
- **Tracking RPM Range:** 3 – 300,000 RPM (0.05 Hz – 5 kHz)

- **Spectrum RPM Resolution:** 10 – 10,000 RPM
- **Delta Order of Spectrum:** 0.025 to 1
- **Acquisition Mode:** Free Run, Run Up, Run Down, Run Up and Down, Run Down and Up
- **Order Spectrum View Mode:** Two-dimensional, Waterfall, or Spectrogram (with RPM as z-axis)

Narrowband RPM Spectra

Narrowband RPM spectra are 3D signals that display the Auto Power Spectra changing with RPM. Fixed Band RPM spectra are RMS measurements extracted from the 3D RPM spectrum within fixed frequency bands.

- **RPM Range:** 3 – 300,000 RPM (0.05 Hz – 5 kHz)
- **RPM Resolution:** 10–10,000 RPM
- **FFT Block Sizes:** 256 – 4,096 points (8 channels)
- **Average Mode:** Linear, Exponential, Peak Hold
- **Window Functions:** Hanning, Hamming, Flat-top, Kaiser-Bessel, Blackman
- **Spectrum Type and Scaling:**
  - **Linear Spectrum:** Peak or RMS Scaling
  - **Power Spectrum or PSD:** RMS Scaling
- **Spectrum Units:** EU_{pk}, EU_{rms}, EU_{rms}^2, EU^2/Hz, EU^2·s/Hz
- **Acquisition Mode:** Free Run, Run Up, Coast Down
- **Fixed Band RPM Spectra:** The instrument calculates the total power within a fixed, user-definable band and plots the data against RPM.
- **Spectrum Units:** EU_{rms}, EU_{rms}^2

Order Tracks with Phase

Order Tracks with Phase are order spectra with phase measurement data relative to the tachometer signal. All specifications are equivalent to real Order Tracks. Order Tracks with Phase may also be displayed as Bode, Polar, or Nyquist plots. With this option the Orbit Display is enabled for any two data channels.

Tachometer Processing

The user may view the original tachometer input waveform or translated RPM signal. The user sets the RPM trigger threshold, rising or falling edge detection, and the number of pulses per revolution. Tachometer signal processing automatically removes unwanted noise and glitches.

Octave Analysis and Sound Level Meter (C80X-12, C90X-12)

Octave Analysis

- **Standards:**
  - ANSI S1.11:2004, Order 3 Type 1-D
  - IEC 61260-1995
- **Octave Fractional Resolution:** 1/1, 1/3, 1/6, 1/12
- **Average Type:** Linear, Exponential, Peak Hold
- **Time Weighting:** Fast, Slow, Impulse, User-defined
- **Frequency Weighting:**
  - A, B, and Z comply with IEC 61672-2002 class 1.
  - B complies with IEC 60651-1979 type 0.
- **Midband Frequencies:** Base 10 in accordance with ANSI std. S1.11:2004 Annex A.
- **Frequency Range (Band Centers):**
  - **1/1 Octave:** 0.125 Hz to 16 kHz
  - **1/3 Octave:** 0.1Hz to 20 kHz
  - **1/6 Octave:** 0.1Hz to 20 kHz
  - **1/12 Octave:** 0.1 Hz to 20 kHz
- **Accuracy:** <0.2 dB (1 second stable average, single tone at band center)
- **Dynamic Range:** For a 1/3 octave with a 2 second stable average as per ANSI S1.11:2004, using a pure Sine tone at 1 kHz input:
  - **Noise Floor:** -24 dB
  - **Maximum:** 111 dB
- **Filter Implementation:** Real-time Digital Filters
- **Acquisition Mode:** Free Run, continue after trigger
- **Acquisition Source:** Input Time Signal, RMS Level, Time Delay
- **VC Curves:** Workshop (ISO), Office (ISO), Residential Day (ISO), Operating Theater (ISO), VC-A, VC-B, VC-C, VC-D, VC-E, VC-F, and VC-G

Sound Level Meter

- **Standards:** IEC 61672-1 2002
- **Filter Implementation:** Real-time Digital Filters
- **Frequency Weighting:**
  - A, C, Z (per IEC 61672-2002 Class 1)
  - B (per IEC 60651-1979 Type 0)
- **Time Weighting:**
  - Fast, Slow, Impulse (per IEC 61672-2002)
  - User-defined
- **Average Time Interval:** 0.125 seconds to 24 hours. Unique moving linear averaging method allows independent setting of averaging time interval and time trace update rate.
- **Linear Operating Range:** 110 dB
- **Inherent Noise:**
  - **A weighted:** -10 dB or less
  - **B weighted:** -13 dB or less

- **C weighted:** 1 dB or less
- **Z weighted:** 16 dB or less

- **Measurement Range:**
  - **A weighted:** 0 to 110 dB
  - **B weighted:** 0 to 110 dB
  - **C weighted:** 5 to 110 dB
  - **Z weighted:** 20 to 110 dB
- **Frequency Weightings:** Z, A, B, C
- **Time Weighting:** Fast, Slow, Impulse, User-defined
- **Sound Level Measurements:** Time-Averaged, Sound-Exposure, Statistical, Peak, Maximum Time-Averaged, Maximum Time-Weighted, Minimum Time-Averaged, Minimum Time-Weighted
- **Acquisition Mode:** Free Run, continue after trigger
- **Acquisition Source Type:** Input Time Signal, RMS Level, Time Delay
- **Measure Time Control:** Free Run, User-defined
- **Decay Time Constants:**
  - **Fast:** 34 dB/s (per IEC 61672-1 2002 requires >25 dB/s)
  - **Slow:** 4.34 dB/s (per IEC 61672-1 2002 requires 3.4 – 5.3 dB/s)
  - **Impulse:** 35 ms time constant when signal level increasing and 1,500 ms when decreasing

Rotor Balancing (C80X-13, C90X-13)

This function allows correcting the unbalance of a machine using 1 or 2 plane balancing. Parallel measurement of 2 sensors results in a faster, safer, and more accurate procedure.

- **Measurement Type:** acceleration, velocity, or displacement
- **Trial Weight Estimate:** available for both planes
- **Trim Balance:** multiple iterations available
- **Average:** measurement with programmable averaging to reduce the noise
- **Display:** RPM signal display, balancing graphic polar display and time trace display
- **Trial Run:** trial and compensation weight display in tabular mode or graphic polar mode
- **Split Weight:** integrated function to split weight on two defined angles
- **Combine Weight:** multiple weights can be combined together
- **Units:** English or metric units
- **RPM Range:** 5 to 200,000 RPM
- **Phase Display:** display with 4 digits from 0 to 360° (or any other user-defined unit). Accuracy ± 0.5
- **Project Management:** save, recall, and send to PC

Vibration Intensity (C80X-14)

- **Channel Count:** analysis on 3 channels (x, y, z axis)
- **Time Waveform Recording:** raw data recording, weighted RMS Trace for each channel
- **Calculation Methods:**
  - Standard (Basic) Method
  - Running RMS Method
  - Fourth Power Vibration Dose Method
- **Reported Values:**
  - Weighted RMS Total or for individual signals
  - Maximum Transient Vibration Value (MTVV) for each direction
  - Vibration Dose Value (VDV) for each direction
- **Reports:** Automatically generate PDF reports to review on the CoCo or upload to a computer. Reports contain the following values:
  - Applications
  - Position
  - Frequency Range
  - Calculation Method
  - Test Time
  - Weighted RMS – channel
  - Weighted RMS – Overall
  - Test Conclusion (if applicable)
- **Weighted Signal Trace Display:** Track any weighted input channel over time. Values are updated every second.

Whole Body Vibration

- **Standards:** ISO 2631-1:1997
- **Applications:** Health, Comfort, Perception, Motion Sickness
- **Testing Positions:** Seated, Standing, Recumbent (lying)
- **Frequency Weightings:** Wa¬, Wd, We, Wf¬, Wj, Wk¬
- **Frequency Range:**
  - 0.5 Hz – 80 Hz: Health, Comfort, Perception
  - 0.1 Hz – 0.5 Hz: Motion Sickness

Hand-Arm Vibration

- **Standards:** ISO 5349
- **Frequency Weightings:** Wh

- **Frequency Range:** 6.3 Hz – 1250 Hz

Building Vibration
- **Standards:** ISO 2631-2:2003, BS 6472-1:2008
- **Frequency Weightings:** Wm
- **Frequency Range:** 1 Hz – 80 Hz

Ship Cabin Vibration
- **Standards:** ISO 6954:2001
- **Frequency Weightings:** Wm
- **Classification:** A, B, C
- **Frequency Range:** 1 Hz – 80 Hz

Modal Data Acquisition (C80X-15, C90X-15)

Modal Data Acquisition (MDA) is a dedicated user interface for entering impact testing coordinates during testing. Geometric coordinates are stored in the file header, allowing easy importing into supported modal modeling packages.

- **Signal Types:** Time Waveform, Auto and Cross Spectrum, Frequency Response Function, and Coherence
- **Input Type:** Excitation and Response
- **Roving Pattern:** Excitation or Response with Optional Point ID Auto Increment function
- **File Export via EDM:** ASAM-ODS, UFF, and Binary UFF

CoCo Testing Plan

The CoCo Testing Plan provides an overview of the measurement process and provides the ability to customize the measurement entries. A testing plan is automatically generated in EDM Modal using the geometry model, input channel settings and selected roving mode. The testing plan is uploaded directly to the CoCo, and after all measurements are taken the data files are transferred to the EDM Modal software on the PC. The CoCo Testing Plan provides users with a seamless integration of the modal analysis process.

Automated Test and Limiting Check (C80X-16, C90X-16)

The Automated Limit Test function allows the CoCo to compare live data to predefined limits in the time or frequency domain.

- **Test Signals:** Time Blocks, Auto Power Spectra, Frequency Response Functions, Octave Spectra, Linear Spectra and Coherence Functions
- **Supported Limit Signal Types:** High or Low, user-definable Profile
- **Supported Spectrum Type:** EU_{peak}, $EU_{pk\text{-}pk}$, EU_{rms}, $(EU_{rms})^2$
- **Max Limit Signals:** 64
- **Test Schedule:** multiple test schedules may be saved and executed sequentially
- **Testing Log and Summary Report:** up to 1,024 major events are automatically logged. A summary report showing limit check results is available for the last schedule run.
- **Schedule Activation Control:** schedules are easily enabled with a long press of the Display button.
- **Limit Check Alarm Events:** Beep, Flash Screen, Add Event to Log, Send Message to Host PC, Save Signals, Send Emails

Swept Sine Frequency Response (C80X-17, C90X-17)

- **Measurement Quantity:** time stream of each channel (raw data), amplitude spectrum of each channel, frequency response (transmissibility signals) between any channel to channel 1 as reference channel.
- **Sweeping Frequency Range:** 0.1 Hz – 46 kHz, up to 8 input channels
- **Display Spectrum Resolution:** 200, 256, 400, 512, 800, 1024, 1600, 2048, 3200 or 4096 (Note: the actual Sweeping Sine Frequency is continuous and not depending on the Display Spectrum Resolution)
- **Horizontal Scale and Sweep Mode:** Log or Linear
- **Tracking Filter:** On or Off, 7 – 100% of Sweeping Frequency
- **Sweep Rate:** 0.01 to 6000 Hz/sec (Linear), or 0.01 to 100 octaves/min (Logarithmic)
- **Initial Voltage:** 0.001 to 1 V
- **Sweep Loops:** any integer or fractional number
- **Output Control Modes:** Constant Level Output, Profile Output, and Input Control

Shock Response Spectrum Analysis (C80X-18, C90X-18)

Compute Shock Response Spectrum (SRS) for all channels up to 12 octave ranges using maxi-max, maximum negative, and maximum positive analysis techniques.

- **Filter Implementation:** Real-time digital filters that simulate single degree-of-freedom system.
- **Octave Fractional Resolution:** 1/1, 1/3, 1/6, 1/12, 1/24, 1/48
- **Filter Damping Ratio (1/2Q):** 0 – 100%
- **Average Types:** Linear, Exponential
- **SRS Spectrum Types:** Maximum Positive, Maximum Negative, Maxi-max.

Power System Stabilizer (C80X-20)

Calculates FRF signals and provides phase information. The output voltage is set and adjusted manually by the user during testing.

- **Standards:** GB/T 7409, DL/T 583, DL/T 650, DL/T 843
- **Measurement Type:** Voltage
- **Average Type:** Linear, Exponential, Peak Hold, Synchronous Linear, Synchronous Exponential
- **Measurement Channels:** 2 input channels

Global Positioning System (C80X-21, C90X-21)

Users can acquire GPS signals during a measurement. The GPS display includes time, altitude and latitude/longitude information. GPS data is stored with the measurement data and can be viewed and post processed using EDM Post Analyzer. The GPS data transfer rate is 9600 bps; it uses an internal serial bus. An external antenna must be installed to receive GPS data.

Sound Power (C80X-23, C90X-23)

Sound power measurement using sound pressure is now available on the CoCo-80X. Sound pressure levels and corresponding sound power are calculated based on the ISO 3744 and 3745 standards.

An intuitive user interface along with helpful graphics displays the test point status. There are multiple test room types and microphone arrangements. When the test is complete, a report is generated. Octave spectra signals are also saved during the test.

- **Standards:** ISO 3744 and 3745
- **Octave Fractional Resolution:** 1⁄3
- **Average Type:** Linear, Exponential, Peak Hold, Synchronous Linear, Synchronous Exponential
- **Time Weighting:** Fast, Slow, Impulse, User-defined
- **Frequency Weighting:** Z, A, B, C
- **Frequency Range:** 0.1 Hz to 20 kHz
- **Accuracy:** <0.2 dB (1 second stable average, single tone at band center)
- **Dynamic Range:** For a 1/3 octave with a 2 second stable average as per ANSI S1.11:2004, using a pure Sine tone at 1 kHz input:
- **Noise Floor:** -24 dB
- **Maximum:** 111 dB
- **Filter Implementation:** Real-time Digital Filters
- **Acquisition Mode:** Free Run
- **Test Room Types:** Hemi – Anechoic and Anechoic
- **Microphone Arrangements:** Fixed – Equal/Unequal Areas, Co-Axial, Meridonial, Spiral

Optional Vibration Data Collector Software

VDC Mode (C80X-02)

The CoCo-80X operates in either Dynamic Signal Analysis (DSA) or Vibration Data Collector (VDC) mode. This section specifies the optional software functions of VDC mode. The CoCo-80X VDC mode has both route based data collection and onsite measurement functions. The route based data collection mode includes: overall readings, time waveform, spectrum and demodulated spectrum. Onsite measurement mode conducts the following tests in addition to the data collection functions: bump test, coast-down / run-up, and balancing. For balancing in VDC Mode, purchase Part Number **C80X-02.**

Route Collection Function

- **Route Tree Structure:** Database, Factory, Machine, Point, Direction and Measurement Entry
- **Advance in Measurement Entry:** Manual or Automatic
- **Measurement Channels:** 1 or 3 channels (tri-axis) with tachometer enabled or disabled.
- **Data Review:** Users can recall previously measured data for review in the same format and style when the data is saved.
- **Route Collection Control:** Easy navigation from the UI level to routes. View or hold live signals, review measured record, previous measurement entry, next measurement entry, previous point, next point, point and route management.

Vibration Overall Level Readings

Available in both route collection and onsite mode.

- **Measurement Quantity:** Acceleration, Velocity, Displacement, Current and Tachometer
- **Overall Level Readings:** Peak, Peak-peak, Average, Overall RMS, True RMS
- **AdB, VdB, amps:** US and SI options for both AdB and VdB
- **Magnitude and Cursors:** overall RMS value, dual cursors, harmonics, digital readouts on chart
- **Amplitudes at Orders:** display the spectrum amplitude at 1, 2, and 3 rotating orders
- **RMS Calculation in Band:** calculate RMS value for any time or auto power signals between two cursors.

Waveform and Spectrum

Available in both route collection and onsite mode.

- **Time Waveform Number of Samples:** 1024, 2048, 4096, 8192, 16384, 32768

- **FFT Resolution:** 400, 800, 1600, 3200, 6400, 14400 (selectable)
- **Frequency Range:** 22 Hz to 46 kHz in 34 selectable stages (and equivalent RPM)
- **Data Window Functions:** Uniform, Hanning
- **Spectral Averaging:** Exponential, Linear, Peak Hold
- **Overlapping Ratio for Spectral Analysis:** automatic, 0%, 25%, 50%, or 75%
- **Measurement Quantity:** Acceleration, Velocity, Displacement, or Electrical Current
- **Display Spectrum Type:** Peak, Peak-peak, RMS or dB
- **Frequency Domain Axis:** Hz, RPM, or Order
- **Unit:** English and metric units
- **RPM Detection:** user-defined, read from tachometer, or estimated from spectrum

Demodulated Spectrum

Available in both route collection and onsite mode.

- **Demodulation Bandwidth:** 24 bandwidth options from 125 Hz to 1.44 kHz up to 32 kHz to 46.08 kHz

Other settings are the same as that of Waveform and Spectrum.

Zoom Spectrum Analysis

Available in onsite mode, compute coherence, auto power spectra, and phase spectra within a user-defined frequency band. With Zoom Spectrum Analysis, the user achieves very high frequency resolution without computing the entire spectrum.

- **Functions Computed:** Linear Spectra, Auto Power Spectra, Coherence, and Phase.
- **Maximum Analysis Frequency:** 4 inputs: up to 46 kHz
- **Smallest ZOOM bandwidth:** 0.28125 Hz
- **Maximum Zoom FFT Lines:** 1800 lines
- **Highest Theoretical Frequency Resolution:** 0.00015625 Hz
- **Acquisition Modes:** Free-Run or External Trigger

Signal Display

The signal display window consists of one or two traces on the LCD panel. Each trace displays one or more signals in the format of a reading or graphic plot.

- **Display Traces:** Readings Only, Waveform Only, Spectrum Only, Readings + Readings, Readings + Waveform, Readings + Spectrum, Waveform + Waveform, Waveform + Spectrum, Spectrum + Spectrum and Demodulation Spectrum. Users can switch from one trace to another by pressing the Next Trace button.
- **Horizontal Axis of Spectrum Scaling:** Linear, Log
- **Vertical Cursor:** one or two vertical cursors controlled with the arrow buttons
- **Cursor Numeric Display:** Shows the signal values on screen at the cursor location for all signals in a trace. Cursor value display area can be moved.

Alarms

- **Alarms Levels:** up to 3 alarm levels (Warning, Alarm, Danger), comparison to previous measurement
- **Reading Alarm:** alarms can be applied to Overall RMS, Peak, Peak-peak, Average or True RMS for each channel. Alarms can be created using baseline values.
- **Waveform Alarm:** Alarms will apply to the time domain.
- **Spectrum Band Alarm:** applied to any spectrum and checked against the whole frequency range or a specific band
- **ISO Standard Alarm:** ISO-10816-2 for land-based steam turbines; ISO 10816-3 for industrial machines; ISO 10816-4L for gas turbines.
- **Display:** Instantaneous Measurement, Measured Value, Alarm Limits, and Previous Measurement. Bar graph display of measurement and alarm levels.

Input Channel and Sensor Settings

- **Level Display:** bar graph displays the input level. IEPE sensor detection
- **Sensitivity:** user-defined with engineering units and input sensitivity settings
- **Labels:** user-defined channel labels
- **Input Types:** AC/DC/IEPE coupling and differential or single-ended input type
- **Built-in Integration and Double Integration:** When acceleration is selected as the physical measurement quantity, digital integration or double integration can be applied to obtain velocity or displacement quantity. When velocity is selected as the measurement quantity, digital integration can be applied to obtain displacement. The engineering units after integration or double integration can be set for each channel.
- **Digital High-Pass Filter:** user-defined cutoff frequency for each channel

CoCo Front-end Calibration Software (option number: FECT-30M)

A front-end is calibrated at the factory before shipping and should be recalibrated annually by the factory or a factory authorized calibration service. EDM Utility includes an

optional stand-alone Front-End Calibration Tool (FECT) that is operable by either the user or a calibration specialist. Calibration data is stored inside of the CoCo front-end.

FECT Functions: The calibration software reads the calibration data stored on CoCo devices and makes this available for viewing or exporting to a report. To have measurements at multiple frequency points before and after calibration, the factory calibration procedure and the specified fluke meter must be used. Users can view the calibration report in FECT or print the report in a Word or PDF format. For more details, please refer to the FECT specifications.

Ordering Information

PC Requirements for EDM Software

- **Operating System Support:** Windows 7 or higher
- **Operating System Type:** 32-bit or 64-bit
- **Minimum Processor Speed:** 1.5 GHz Dual-Core x86
- **Minimum RAM:** 4 GB
- **Minimum Free Space:** 10 GB

Warranty and Support

Crystal Instruments provides a 1 year software subscription and 1 year hardware warranty with each hardware purchase (C80X-P02 to C80X-P08). Extended warranty and support options are available for all Crystal Instruments products. Warranty and support options are separated into three categories: software subscription, hardware warranty, and the Comprehensive Technology Support Agreement.

An extended software subscription includes periodic updates, bug fixes, and application support by phone or online. Users can download all new updates without extra charge during the subscription period. The extended hardware warranty provides repairs at no charge. For repairs, the customer is responsible for the shipping fee and arrangements to Crystal Instruments' factory. Crystal Instruments will pay for and arrange for the unit to be shipped back to the customer after repairs are complete. The extended hardware warranty can only be purchased for products still under warranty. The Comprehensive Technology Support Agreement includes both the software subscription and limited hardware warranty, in addition to an annual hardware calibration, and temporary loaner unit. See the Comprehensive Technology Support Agreement Brochure for more information.

Part Numbers

Part Number	Short Description	
Hardware – DSA Only		
C80X-P02	CoCo-80X system: Two inputs, One output, with DSA	
C80X-P04	CoCo-80X system: Four inputs, One output, with DSA	
C80X-P06	CoCo-80X system: Six inputs, One output, with DSA	
C80X-P08	CoCo-80X system: Eight inputs, One output, with DSA	
C80X-P02NW	CoCo-80X system: C80X-P02 without Wi-Fi	
C80X-P04NW	CoCo-80X system: C80X-P04 without Wi-Fi	
C80X-P06NW	CoCo-80X system: C80X-P06 without Wi-Fi	
C80X-P08NW	CoCo-80X system: C80X-P08 without Wi-Fi	
C90X-P16	CoCo-90X system: Sixteen inputs, One output, with DSA	
C90X-P16NW	CoCo-90X system: C90X-P16 without Wi-Fi	
Hardware – VDC Only		
C80X-P02V	CoCo-80X system: C80X-P02 with VDC	
C80X-P04V	CoCo-80X system: C80X-P04 with VDC	
C80X-P02VNW	CoCo-80X system: C80X-P02V, without Wi-Fi	
C80X-P04VNW	CoCo-80X system: C80X-P04V, without Wi-Fi	
Software Options		
C80X-01, C90X-01	Standard DSA Mode	standard
C80X-02	VDC Mode	
C80X-11, C90X-12	Order Tracking	
C80X-12, C90X-12	Octave Analysis and Sound Level Meter	
C80X-13, C90X-13	Rotor Balancing	
C80X-14	Vibration Intensity	
C80X-15, C90X-15	Modal Data Acquisition (MDA)	
C80X-16, C90X-16	Automated Test and Limiting Check	
C80X-17, C90X-17	Swept Sine Analysis	
C80X-18, C90X-18	Shock Response Spectrum (SRS)	
C80X-19, C90X-19	Digital Filters	standard
C80X-20	Power System Stabilizer (PSS)	
C80X-21, C90X-21	Global Positioning System (GPS)	
C80X-23, C90X-23	Sound Power	
Removal Options		
C80X-31, C90X-31	Remove wireless communications board (GPS/Wi-Fi). Factory configuration only.	
Accessories		
C80X-A01	CoCo-80X Battery	standard shipment includes 1
C80X-A02	AC to DC Power Supply	standard shipment includes 1
C80X-A02NA	North America Power Plug	standard shipment includes 1
C80X-A02EU	Europe Power Plug	
C80X-A02UK	UK Power Plug	
C80X-A04	Battery Charger (Desktop)	
C80X-A10	LEMO-BNC Cable for Output (20 cm)	standard shipment includes 1

C80X-A11	LEMO-BNC Cable for Tacho (20 cm)	standard shipment includes 1
C80X-A12	CAN BUS Adaptor Cable: LEMO to OBD-II (1 m)	standard shipment includes 1
C80X-A13	CAN BUS Adaptor Cable: LEMO to wire clips (1 m)	standard shipment includes 1
C80X-A14	GPS Antenna	
C80X-A15	Alligator to Alligator Clip adaptor	standard shipment includes 1
C80X-A16	BNC-BNC Cable (1 m)	standard shipment includes 1
C80X-A17	BNC To BNC T-port	standard shipment includes 1
C80X-A20	Ruggedized Hard Case (Pelican)	standard shipment includes 1
Additional CoCo Accessories		
C80X-A50	SD Card to USB Card Adaptor and Reader	
C80X-A51	128 GB SD Card	standard shipment includes 1
C80X-A52	256 GB SD Card	
C80X-A60	USB Mini-b (5-pin) to USB A-Type Cable (1 m)	
C80X-A61	HDMI adaptor cable(1 m): Type C to Type A	standard shipment includes 1
C80X-A66	Ethernet cable (1 m)	standard shipment includes 1
C80X-A68	Audio Adaptor cable (20 cm)	
C80X-A90	CD for EDM, the host software, User's Manual in PDF	
C80X-A91	USB Stick for EDM, the host software, User's Manual in PDF	standard shipment includes 1
C80X-A93	Certificate of Calibration	standard shipment includes 1
C80X-A95	Equipment Condition Certificate	
General Software Options		
FECT-30M	Front-end Calibration Software	

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