

Datalogger 128 channels with integrated measuring packaging

APPLICATIONS

- All types of multi-parameter tests.
- Static testing of large aerospace structures in which are located thousands of measuring channels.



DESCRIPTION

CEMESSA is a smart 128-channel measuring central unit, with a built-in sensor conditioning system, meeting the constraints of static testing of large aerospace structures in which are located thousands of measuring channels.

This central unit integrates a ratiometric process that makes measures insensitive to lengths of sensor wires. It also has hardware tags, thus allowing the transmission of measures, along with the type and the related conditioner card number, and preventing any risk of computer configuration error. Finally, it features a 'triggering' mode, able to memorize 70 seconds of testing during the breakage of a structure. As it is universal, this measuring unit is adapted to any application.

First of all, the central measuring unit CEMESSA is an extensometer instrument that can perform measures, using 120 or 350-type stress gauges, using a $\frac{1}{4}$ bridge or a complete bridge jig. It can also perform measures of displacement, of temperature, of current, of low or high-level voltage, the sensors being powered or not.

MAIN FEATURES

- Conditioning cards to plug in acquisition cards, in order to perform extensometer measures, temperature measures using a thermocouple, displacement measures using a potentiometer, current and low or high-level voltage.
- Cycling memory recording to store 10 seconds of measures at a rate of 100 measures/second/channel. On external request, the 'triggering' mode can be activated, thus leading to the local recording of 60 seconds of testing at a rate of 100 measures/second/channel (to complement the 10 seconds that have been already stored) then to the sending of 70 seconds of measures on the asynchronous line.
- Measurement speed: 100 measures/second/channel internally, restitution: 1 measure/second/channel.
- Calculator interface using an asynchronous link.
- Two slots for digital processing cards.
- Eight slots for 16-analog channel acquisition cards (including a 128-channel capacity).
- Vertical presentation box: H 49 cm x L 27 cm x D 44 cm.

1 to 8 IAC3 analog selection/amplification cards including, amongst others, 2 analog amplification selection chains.

- A digital analog conversion part, 2 CADs that digitalize, in parallel, analog physical quantities coming from 'MEASURES' and 'REFERENCE' chains of the IAC3 card.
- A digital processing part of the signal and the management of resources, thanks to 2 processing processors of the signal, on which are set the different tasks required by the processing.

1 CAD and CTN5 digital processing card makes the decisional element of the central unit. It includes:

- The formatting, then the emission, of data processed on the asynchronous line of the DSP (RS232), at a rate of one cycle of measures per second, which means, in exploitation mode, one per cent of measures being acquired and locally recorded to the central measuring unit CEMESSA.
- The linearization of temperature measures, using a K-type thermocouple.
- The ratiometric calculation (each measure is related to an additional measure selected as a reference) performed on extensometer and displacement measures. Note: the ratiometric process makes extensometer and displacement measures insensitive to resistance variations of sensors and conditioning cards.
- The corrections of error terms of analog resources of the central unit.
- The digital processing applied to acquired measures: decimation, then FIR-type digital filtration over the totality of acquired channels, whatever their type, at a rate of 100 measures/second/channel.
- The recording in a SRAM external memory (1 16-bit mega-word) of 10 seconds of measure at a rate of 100 measures/second/channel. On external request, the measuring unit can activate the 'triggering' mode'. The CEMESSA central unit then performs the local recording of 60 seconds of testing at a rate of 100 measures/second/channel (to complement the 10 seconds that have been already recorded) then to the sending of 70 seconds of measures on the asynchronous line.
- The local performance of test modules.
- The general management and the digital processing of acquired measures: setting up the equipment, time-related management of acquisition, digital conversion (CAD activation) and sending of measures on the asynchronous series line.

The different tasks required to the processing are:

- The card CQP2_A_120 to perform extensometer measures using a $\frac{1}{4}$ bridge jig for 120-Ohm gauges.
- The card CQP2_A_1350 to perform extensometer measures using a $\frac{1}{4}$ bridge jig for 350-Ohm gauges.
- The card CDMIP_A_120 to perform extensometer measures using a $\frac{1}{2}$ bridge jig for 120 or 350-Ohm gauges.
- The card CDOPC2_A_120 to perform extensometer measures using a complete bridge jig for 120 or 350-Ohm gauges.
- The card COPOT2_A for measures of displacement using potentiometers.
- The card CTMP2_A to perform measures of temperatures using thermocouples.
- The card COMT2_A_V to perform measures of low and high-level voltage.
- The card COMT2_A_I to perform measures of current.
- The card CAMT2_A for measures of voltage or current through sensor power.

Each IAC3 card is related to a conditioning card that customises it. It is automatically recognised by the central unit and can be plugged in, while powered. Nine types of conditioning cards are available.

- Both TAG octets give the number of the connected conditioner card; these 2 information are send, in addition to measures processed, on the asynchronous series line.
- The MEASURE TYPE octet makes possible to the central unit to know the type of connected conditioner. Also included, in addition to components related to each type of conditioner, 2 sets of 'On-Off' digital information and a reading bus of these encoded values:
- These conditioning cards are inserted in a protective mechanical box prior to being placed in the sub rack of the measuring central unit.

The central unit provides two standard powers (4 and 2 volts) to power gauges and potentiometers connected to cards CQP2_A_120, CQP2_A_350, CDMIP_A, COPC2_A, COPOT2_A and, in addition, to power electronic sensors by providing energy, as $\pm 15V$ DC and $+28V$ DC currents, through the CAMT2_A card.

- The operating mode is the operational mode, where the equipment sends acquired and processed measures on a series line.

- The local test mode is used to, through an alphanumerical console or through a PC fitted with an alphanumerical terminal emulation software (Escher Tune Emul for instance), perform the testing and the control of the measuring central unit, in order to evaluate metrology an functional characteristics and to perform, if necessary, the setting up of analog elements. The local testing program is a resident program in the central unit.

The central measuring unit CMESSA includes two running modes: the operating mode and the local test mode (control mode). Selecting one running mode (operating or control mode) is performed by wiring a strap on the series RS-232 link connector of the central unit CMESSA.