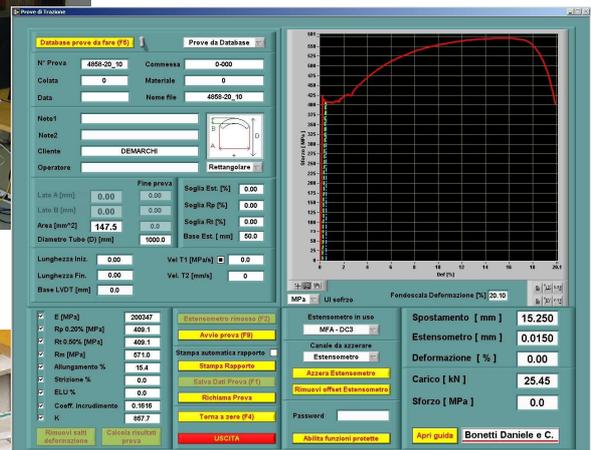


# RT3 REAL TIME DIGITAL CONTROL SYSTEM



Tecnologia Italiana

## Description

The digital control system RT3 is the result of twenty five years of experience in the field of experimentation, with particular reference to material testing and simulation systems, working for major industrial groups, research centres and Universities.

RT3 is the result of a custom design based on the integration of advanced technology components, reliable, easy to find and to replace with the same that the market will offer in the more advanced versions.

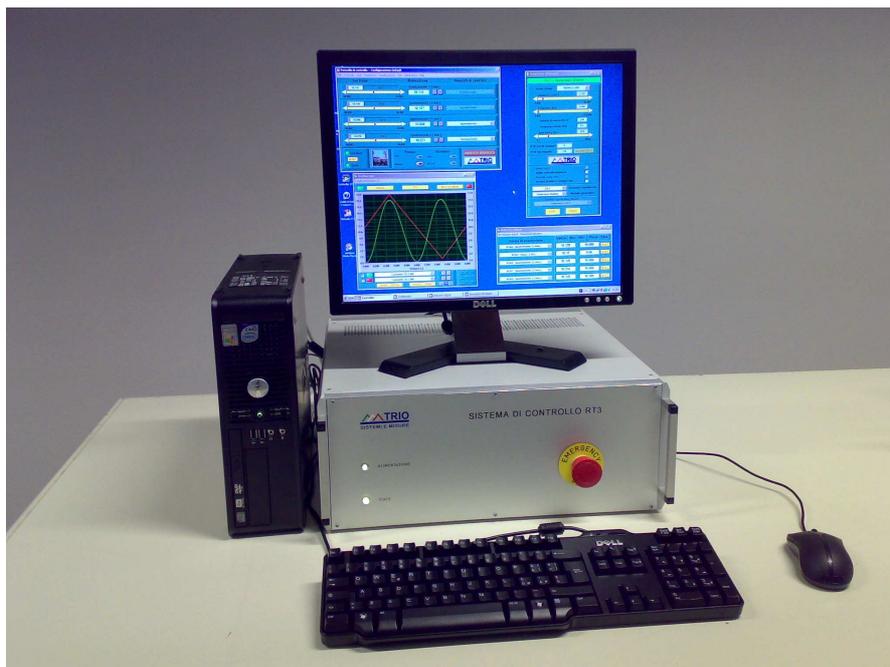
It's built on the Real Time National Instrument hardware platform and the software is entirely developed in LabView. In particular RT3 system is made up by an embedded computer and by one or more acquisition and generation boards that are selected and combined according to the specific features of the final application. The different components are available on the market and are easy to find in case of update or improbable failure.

The RT3 control system is managed by an application software that works with a Real Time operating system and is interfaced by an ethernet link with a normal PC in a Windows 7 environment, where reside application software developed with LabView for the system management, the user interface, the configurations database and the data acquisition.

Into RT3 system there are the electronic modules for the transducer conditioning, the drive of the servovalves and the management of the hydraulic or electric devices.

According to these ideas and considering the versatility of his software, the system will maintain his value and his actuality in the years to satisfy the growing future operative needs. The particular initial configuration of RT3 can be upgraded to increase the number of control and acquisition channels to build complex testing devices.

RT3 can be used to drive and control servo hydraulic and/or electromechanical test systems.



## Main features of the RT3 system

Acquisition and generation boards with a resolution of 16 or 18 bits.

Update frequency of the PID loop up to 4 kHz.

Maximum data acquisition frequency up to 4 kHz.

It's possible to configure the control channels according to the selected hardware (from 1 to 4).

More control channels are possible with RT3 expansions.

Data acquisition and control channels: 32.

Integrated anti-aliasing filters.

Signal conditioning for strain gauge and lvdt transducer.

Power supply of 24 V and +/- 12 V on the connector, for transducers with integrated electronics.

Conditioning of encoder transducers (option).

Conditioning of SSI transducers (option).

Transducer calibration with definition of the engineering unit, polarity and relative zero.

Software setup of the built in transducer conditioners.

Every measure is made automatically compensating the calibration curve of the correspondent transducer, without the traditional limit imposed by the "best-fit" straight line.

Possible connection of external signals for feedback and / or acquisition.

Calculated channels used also for feedback.

Software functions for digital filtering of signals.

Hydraulic power supply management: off-low-high pressure.

Manifold system management: off-low-high pressure.

The system can be set up according to the hydraulic circuit configuration, with and without pump and manifold.

Emergency stop button on the front panel and remote emergency connection.

Function generator: command definition (ramp, sine, triangle, square, external, arbitrary, random), frequency, span amplitude, number of cycles preset.

Function generator management stop-run-pause with soft start and stop.

Automatic amplitude and phase control functions (selection from peak-valley or harmonic mode).

Integrated functions of setpoint rate and span rate.

Cycle counter function to stop the program or turn off the hydraulic system.

Graphic and numeric visualization of the characteristic quantities directly in engineering units.

Numerical display: timed current values, max & min; peak & valley.

Digital oscilloscope and frequency analyzer.

Transfer function amplitude and phase graph.

X-Y scope.

Strip chart monitor.

Feedback selection and control mode selection with on-line bumpless change.

Zeroing and taring of signals (also for the signal used for feedback).

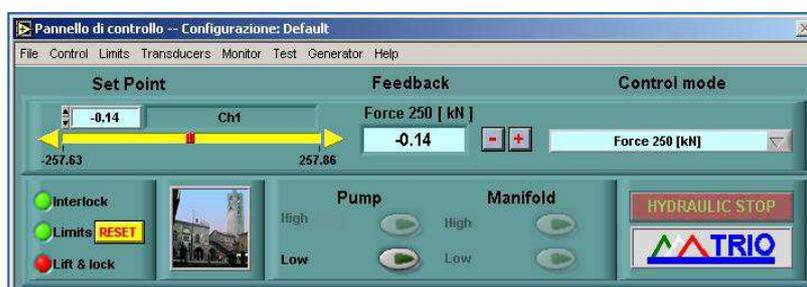
Limit detector with the following functions:

- none;
- indication;
- hold generator;
- stop generator;
- stop manifold;
- interlock pump;
- change control mode and ramp to a preset value.

Underpeak detector functions.

Log file for the limit detector action.

For any interlock trip the signals are automatically saved on disk for the analysis, also when the data acquisition is not active.



Control mode definition with transducer or calculated channel feedback selection.

PIDF parameters definition for every control mode.

Digital low pass filtering of the drive signal to the servovalve.

Servovalve drive with current or voltage signals.

PD control of the inner loop of three stage servovalves.

Dither amplitude regulation and frequency selection.

Electronic balancing of the servovalve offset and polarity selection.

Safety limiting of the maximum command to the servovalve.

Stabilization functions for the oil column frequency (Delta-P).

Integrated feedback function of a signal with automatic limitation of a second signal (this mode is helpful during the test set-up stage, where for example is possible to control the actuators in displacement mode with automatic limitation of the applied force).

Data acquisition up to 4 kHz with streaming to disk.

Application software specific for fatigue test;

main features:

- scheduled data acquisition;
- online graph of every signal vs number of cycles done;
- specimen rigidity monitoring with change detection and test termination.
- Step profile test;

definition and execution of a test as sequence of predefined steps as:

- change control mode;
- hold;
- ramp;
- cycling;
- digital output.

Every step can be recorded with a defined data acquisition sampling rate;

loop repetition of some steps; step change for signal threshold level;

synchronization of different control channels.

The functions of RT3 control system can be integrated with specific application software designed for the execution of tests in the following sectors:

- material testing (tension, compression, bending, LCF; HCF...);
- fatigue test on components;
- TMF thermal and mechanic fatigue test;
- Fracture mechanics: da/dn, K1C; J1C;
- Dynamic characterization and asphalt test package;
- seismic simulation;
- road simulation;
- sweep sine;
- tests in the geomechanic and geotechnic sectors;
- reproduction of typical profiles of the structural aerospace sector;
- simulation tests for the controlled reproduction of solicitations directly measured on components.

Trio Sistemi e Misure can design and produce control systems for special test rigs, based on the specifications of the customer.

For instance RT3 in a special version, control a test rig with 25 hydraulic servo actuators operating simultaneously for the fatigue test of a complex railway structure.

