7. Selection guide for sensors & electronic controllers

7.1 Selection guide

The driving electronics of the APA®, MLA or PPA are based on the 75 family of 19 inches electronic boards. Versatile system can therefore be designed from 19 inches racks including at least (see section 6.1):

- An AC/DC or a DC/DC converter necessary to produce high stabilised DC voltage,
- An amplifier to drive the piezoelectric actuator generally between –20V and 150 V.

If a fine positioning is required, it may be necessary to use a closed loop:

- A position sensor and its electronics,
- A force sensor or an accelerometer and its electronics,
- A closed loop servo controller.

With CEDRAT TECHNOLOGIES' offer, you can build your own system according to your needs (Table 7.1) by combining a driver, a sensor and a controller.

The UC45 board can be plugged to an amplifier board and integrate a one channel low-frequency digital controller and a link to a host PC. This link is managed through a hub on the 75 Rack Family to handle several channels. The UC75 board is a powerful platform based on Labview®Real-Time offering the state of the art in digital control and the capability to handle several channels. Please do not hesitate to contact CEDRAT TECHNOLOGIES by phone or email at actuator@cedrat.com for more detailed information and help in the selection of your configuration.

Model serie	Unit	SG75	ECS75	UC45	UC75
Notes		-	-	-	-
Function		*Strain gauges conditioner*	*Eddy current sensor conditioner*	*Numerical servo controller*	*Micro controller / FPGA*
Main or supply voltage	*V*	*-15 / 15 VDC [f]*	*-15 / 15 VDC [f]*	*-15 / 15 / 5 VDC [f]*	*-15 / 15 / 5 VDC [f]*
Output voltage	*V*	*-12 …12*	*-10 ... 10*	*-1 … 7.5*	*-1 … 7.5*
Number of channels		*1 to 3*	*1 to 3*	*1 per channel*	*1 to 4 per board*

Table 7.1: Compatibility of sensors & control electronic sub-system of the 75 family

The 75 rack family will soon include a Transducer Electronic Data Sheet (TEDS) function monitored by the UC45 & UC75 controllers (Figure 7.1). The TEDS function relies on a memory included in the sensor's board, storing the gain of the sensors. Hence, the controller is automatically able to read this memory. In a closed loop multi channel application, this function eases the calibration activity.

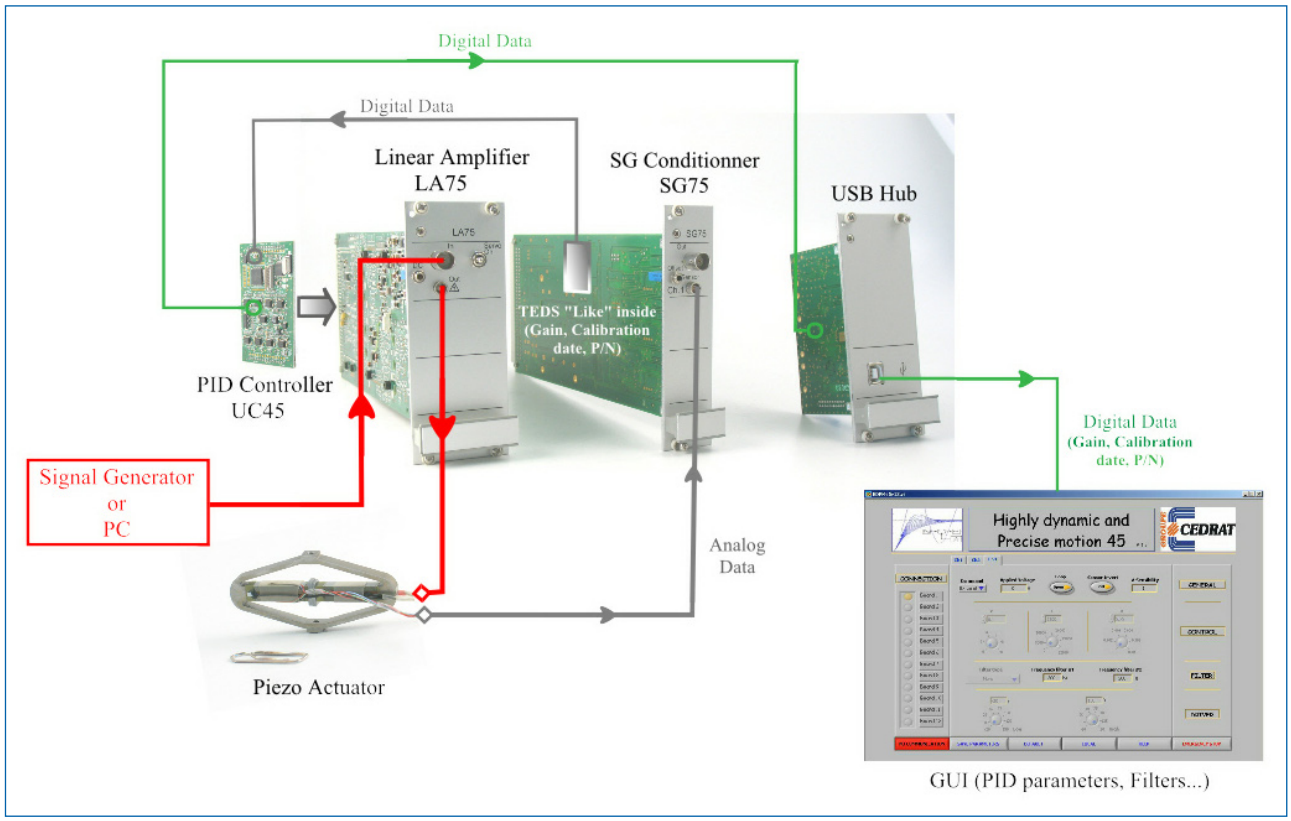

Figure 7.1: Synoptic of the TEDS approach

7.2 SG75 Strain Gauges Conditioner

The SG75 Strain Gauges conditioner is implemented on a 19' board and can include up to 3 independent channels. The conditioners should normally drive full Strain Gauges bridges.

The gain of each channel is generally set when the Strain Gauges bridges are bonded onto the Piezo Actuators. This board can be provided alone in an RK12F rack.

References	Unit	SG75-x
Item Code		*V-SG75-1*
Notes		*x : number of channel*
Function		*Strain Gauges conditioner*
Max. number of channels		*3*
Supply voltage	*VDC*	*-15 / 15*
Output voltage	*V*	*-12 ... 12*
Signal / Noise ratio	*dB*	*70*
Output bandwidth [c]	*Hz*	*2000*
DC offset setting		*10 turn potentiometer*
External Sensor connector		*LEMO EGG.00.304.CLL*
External Control Output		*BNC / 50 Ohms*
Rear Interface		*DIN 41612 FormeC 64/96*
Weight	*kg*	*0.15*
Dimensions	*mm*	*6F wide, 3H high*

Table 7.2: Characteristics of the SG75 Strain Gauges conditioner

Figure 7.2: View of a SG75-2 board

The technical information on this leaflet is not contractual and can be changed without prior notice.

7.3 ECS75 Eddy Current Sensor Conditioner

The ECS75 Eddy Current Sensor conditioner is implemented on a 19' board and can include up to 3 independent channels. The conditioners should normally drive an Eddy Current sensor probe from Lion Precision.

The first two channels can provide a differential function. The gain of each channel is generally set when the Eddy Current Sensor is embedded in the Piezo Mechanism.

References	Unit	ECS75-x
Item Code		*V-ECS75-1*
Notes		*x : number of channel*
Function		*Eddy current sensor conditioner*
Max. number of channels		*3*
Supply voltage	*VDC*	*-15 / 15*
Output voltage	*V*	*-10 / 10*
Measurement range	*mm*	*0.25 / 1.5*
Linearity	*%*	*1.5*
Signal / Noise ratio	*dB*	*85*
Output bandwidth [c]	*Hz*	*10000*
DC offset setting		*10 turn potentiometer*
External Sensor connector		*SMC*
External Control Output		*BNC / 50 Ohms*
Rear Interface		*DIN 41612 FormeC 64/96*
Weight	*kg*	*0.2*
Dimensions	*mm*	*6F wide, 3H high*

Table 7.3: Characteristics of the ECS75 Eddy Current Sensor conditioner

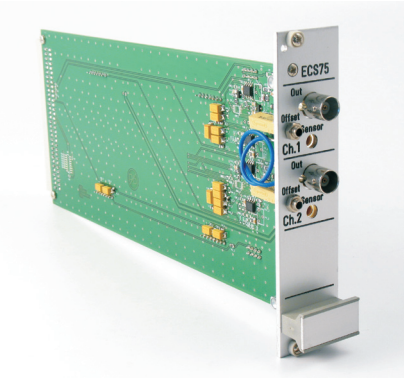

Figure 7.3: View of an ECS75-2 board

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7.4 UC45 Digital Controller

The UC45 digital controller is implemented as an option on the amplifier board (Figure 7.4). The UC45 controller includes a numerical PID controller and notch, anti-aliasing and interpolating filters.

When used in the 75 family rack, the UC45 features also a USB link to an external PC, in order to read voltage, sensors and to send a command (Figure 7.5). The bandwidth is set by the sampling rate (see section 8.4).

The UC45 comes with the HDPM45 GUI, downloadable on our web site.

References	Unit	UC45
Item Code		V-UC45
Notes		-
Function		Option on amplifier board - Numerical servo controller
Max. number of channels		1
Supply voltage	VDC	-15 / 15 / 5
Output voltage	V	-1 ... 7.5
Sampling rate	µs	100
A/D converter		4
Resolution / quantization		16 bit @ +/-10V
D/A converter		2
Resolution / quantization		16 bit @ +/-10V
Computer interface		USB
Weight	kg	0.05
Optional link		SPI
Corrector filter cells		Selectable by the GUI HDPM45

Table 7.4: Characteristics of the UC45 numerical servo controller

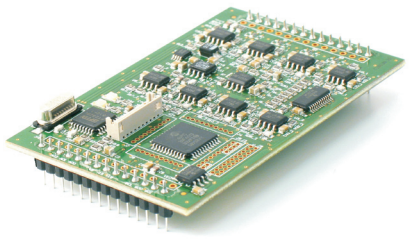

Figure 7.4: View of an UC45 board

Figure 7.5: View of an UC45 hub

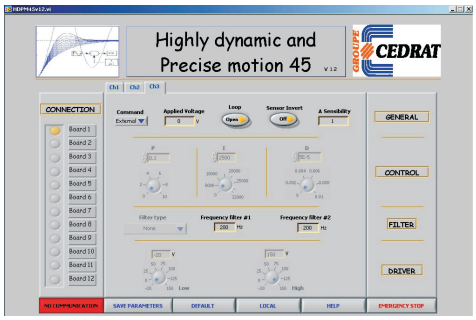

Figure 7.6: View of the HDPM45 GUI

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7.5 UC75 Real-Time Controller

The UC75 real time controller uses a National Instrument Core based on Compact RIO@NI and the power of Labview® from National Instruments Libraries to control any system. The NI CompactRIO programmable automation controller (PAC) is a low-cost reconfigurable control and acquisition system designed for applications that require high performance and reliability. The native parallelism of graphical programming is the best alternative solution to the physical implementation of FPGAs. Indeed parallel loops map used to separate regions of FPGA silicon truly operate in parallel.

The Real time UC75 standard board (Figure 7.7) can be connected to a host PC to analyse the behaviour of the system in real time, to adjust the parameters of the loops via an Ethernet link at 100Mbytes/s or to work standalone. The standard offer comes with a front panel executed on a PC (Figure 7.8). The last version can be downloaded from our web site.

If you have the Labview® Real Time software, you can have a flexible platform and you can make it communicate with other sub-systems.

References	Unit	UC75
Item Code		*V-UC75*
Notes		-
Function [f]		*FPGA Real-time controller*
Max. number of channels		*1*
Max. number of channels		*4*
FPGA capability (gates)		*1 millions 4 slots*
FPGA capability (gates)		*4 millions 4 slots*
Supply voltage	*V*	*-15 / 15 / 5*
A/D converters		*4 up to 32*
Resolution / quantization		*16 bit @ +/-10V*
D/A converters		*4*
Resolution / quantization		*16 bit @ +/-10V*
Sampling rate	*µs*	*40*
Computer interface		*Ethernet link 10-100 Mb/s*
Corrector filter cells		*Selectable by the GUI HDPM75*
Front interface		*SCSI, RJ145 connectors*
Rear interface		*DIN 41612 Forme C 64/96*
Weight	*kg*	*1.3*
Dimensions	*mm*	*26F wide, 4H high*

Table 7.5: Characteristics of the UC75 real-time controller

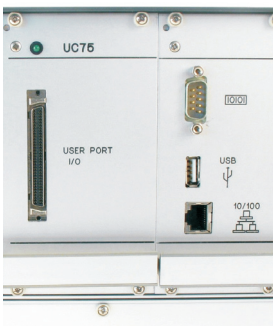

Figure 7.7: View of an UC75 board

The technical information on this leaflet is not contractual and can be changed without prior notice.

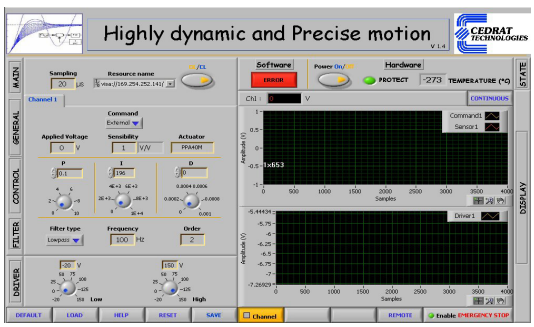

Figure 7.8: View of the Software front panel

