
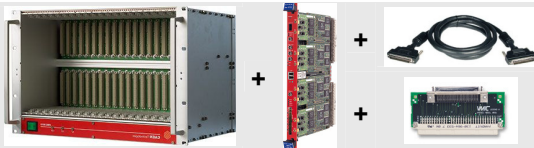


	<i>microIOC</i>	VME
		
	<b>Processing power?</b>	
<i>processor speed</i>	+ ultra low-power, x86-architecture compatible CPU	+ high-performance CPU VME cards, for computing intensive tasks, different CPUs
	<b>Industrial, heavy-duty environment?</b>	
<i>robustness</i>	robust, aluminum case, no rotating parts, industrial grade components	
	<b>Tough implementation deadlines?</b>	
<i>turn-key solution &amp; integration friendliness</i>	+ out of the box plug&play solution + full SW support, guaranteed CS support	+ system-level solution is up to the user or provider-dependent
<i>SW support</i>	+ device drivers, OS and CS integration fully supported, SW team support	+ up to the user or provider-dependent
<i>on site debug</i>	+ direct connection of monitor and keyboard + debug port export via Ethernet or RS232	+ debug port export via Ethernet
<i>whole-system test</i>	+ tested as a complete unit + functionality guaranteed	+ if parts are obtained separately it is up to the user, otherwise provider dependent
	<b>Enough space?</b>	
<i>size</i>	smaller	bigger
<i>physical dimensions</i>	+ desktop 8" 2U case, desktop 12" 2U case, and rack-mount 19" 2U case	+ VME crates of various dimensions, usually much bigger
	<b>Too long/expensive cables, signal-sensitive devices?</b>	
<i>mounting position</i>	+ position closer to controlled devices + easier portability and greater degree of distribution	+ racks contribute to centralized system + limited portability





Variety of interfaces?		
<i>customization</i>	+ user customized fully-exploited back-panel and direct cable connection of controlled devices	+ space-consuming connectors should be separated from the VME card itself (to fully exploit the VME crate) – external terminal boards are required
		
Number of ports?		
<i>price effectiveness</i>	Price effectiveness is determined with the price per required functionality. Below you can find an example for serial ports. Other functionality should be considered similarly.	
	<b>4 x RS232 port</b>	
	partially used microIOC	very small portion of VME crate used
	<b>24 x RS232 port</b>	
	price effective use of microIOC	partially used VME crate
	<b>...even more ports...</b>	
	use several microIOC units	price effective use of VME crate
	<b>General guidelines</b>	
	+ price effective replacement for half-empty VME crate + if required, multiple units can be used	+ price effectiveness of VME-based solution is proportional to exploitation of rack capacity
Future extendibility?		
<i>modularity / scalability</i>	+ variety of PC/104 or PC/104+ cards + up to 3 PC/104 cards per microIOC (optionally 3+3)	+ variety of VME add-on cards + up to 21 slots for add-on cards per crate
SW requirements?		
<i>OS</i>	+ Linux (well-tried Debian) and hard real-time RTEMS	+ supported majority of OSs are (processor dependent), usually commercial VxWorks is used
<i>booting</i>	+ local (avoiding boot-time network congestion) + network	+ usually network boot
<i>support for additional devices</i>	+ development environment, drivers, sample functions + full device support (driver + CS integration (EPICS, ACS)), wide range of common devices already supported	+ dependent upon VME card supplier or system integrator
<i>rapid SW development</i>	+ PC-like environment, standard Linux, drivers available, webmin (GUI tool for rapid SW configuration)	+ dependent upon the OS features and add-on card's provider



*comparison case study*

The following system requirements are assumed:  
 + **48 analog inputs** (500k Samples/s, 16 bit, differential)  
 + **96 digital I/O lines**  
 + **24 RS232/485 communication ports**  
 + **2 GPIB communication ports**

components	
microIOC	VME (typical system presented)
<b>Enclosure</b> (power supply, cooling system)	
+ Rack-mount 19" 2U case, integrated power supply, no cooling required	+ Rack-mount 19" 6U VME enclosure for 12 add-on cards, integrated power supply, 2U 19" active fan unit
<b>CPU, memory, communication</b>	
+ Single Board Computer	+ CPU add-in VME board
+ x86 processor (low-power, 300 MHz)	+ PowerPC <sup>®</sup> processor (1 GHz)
+ 256 MB RAM	+ 1 GB RAM
+ 2x10/100 M Ethernet	+ 2x 10/100 M Ethernet
+ 128MB Flash memory (OS & data storage)	+ network boot
<b>Analog inputs</b>	
+ 3 x A/D conversion PC/104 board (microIOC 1)	+ 3 x A/D conversion VME board
+ direct back-panel connection: 48 BNC connectors	+ transition board + SCSI cable connection + DB25 terminal board
<b>Digital I/O lines</b>	
+ 3 x digital I/O PC/104 board (microIOC 2)	+ 3 x digital I/O VME board
+ direct back-panel connection: 16 x DB25	+ transition board + SCSI cable connection + DB25 terminal board
<b>RS232/485 communication ports</b>	
+ 3 x RS232/485 PC/104 board (microIOC 3)	+ 3 x RS232/485 VME board
+ direct back-panel connection: 24 x DB9	+ intermediate cable connection + 3 x DIN rail terminal board with 8 x DB9
<b>GPIB communication ports</b>	
+ GPIB PC/104 board (microIOC 4)	+ GPIB VME board
+ direct back-panel connection: 2 x IEEE488	+ direct VME card connection: 2 x IEEE488
=	=
	
the rest	
microIOC	VME (typical system presented)
<b>Rack space usage</b>	
4x microIOC = 8U	VME enclosure + fan unit + distribution panels = 12 U
<b>Miscellaneous</b>	
+ out of the box solution: shorter system-development time and integration into the control system	+ management over lower-level details (which cards to use, choice of OS, driver development, etc.)
+ several distributed ultra low-power CPUs	+ higher centralized processing power
+ unit easily taken out of rack and positioned closer to controlled device	

