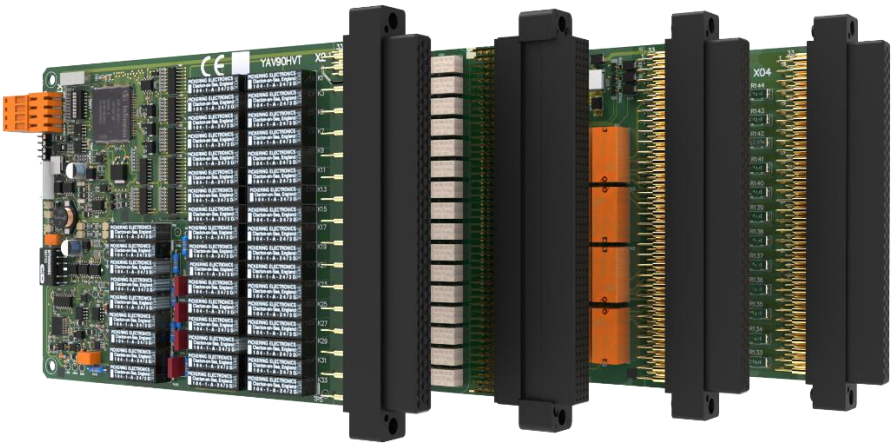
YAVModules

Technical and economic advantages of their use



- → Wide functionality: relays, multiplexers, matrices, flash memory programmers, I/O, pneumatics, radio frequency, high voltage, LED evaluation, variable resistors...
- → Easy implementation: tool receiver, fixture, electrical cabinet and no additional costs (PXI chassis, interface cables, tool receiver modules)
- → Elimination of cross talk between cables
- → Minimum cable length
- → Reduction of engineering and programming time
- → Essential for build to print test systems (repeatable)

1. YAV Modules. Definition and use

In a test system (ATE) or a functional fixture, the switching (relays, multiplexers, matrices, power distribution, IO, etc.) is what allows you to take an instrument to many points of the DUT (Device Under Test) without having to multiply instruments, wiring and connectors.

The classic problem is that, when the switching is placed far from the DUT (or too far from the interface), cable bundles are generated, and this leads to:

- Deterioration of the signal integrity
- Addition of latency and stabilization time
- Increase of measurement errors (especially in small signals, high impedance or RF)
- Price increase of assembly and maintainability

YAV Modules respond to this need with a modular approach: a catalog of standard modules (switching, multiplexing, matrices, digital / analog IO, RF, pneumatics, power distribution, flash memory programming, etc.) that are integrated into the test system interface (RCV) and are typically controlled by CAN bus.

They are supplied by different types of tooling receivers. That is to say, instead of "wiring the world" between instruments and DUT, switching and functionality are set closer to where they matter, thus drastically reducing wiring, weak points and variability.

2. Typical architecture: switching close to the DUT

A key point of the YAV Modules concept is to place the switching as close as possible to the DUT (just behind the system interface or within the fixture / receiver environment), as this minimizes cable length between instrumentation, switching and DUT. This improves signal integrity and repeatability.

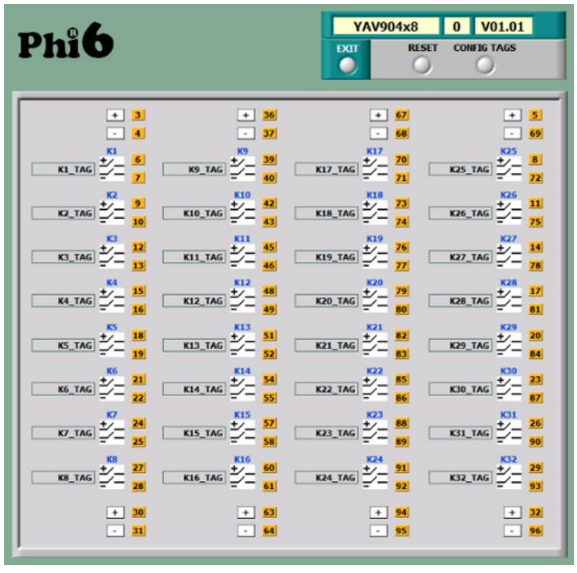
In practice, this translates into:

→ Less cable length = less capacitance/parasitism, less coupling, less noise
→ Fewer transitions/connections = fewer flashing points (loose connections, false contacts)
→ More unit-to-unit consistency = more stable calibration/adjustments

In addition, YAV Modules are controlled via CAN bus, and 6TL offers driver options and integration with

typical test environments (e.g. LabVIEW / TestStand and also APIs in other languages depending on the module / environment).

They have virtual panels to manually check test operations.

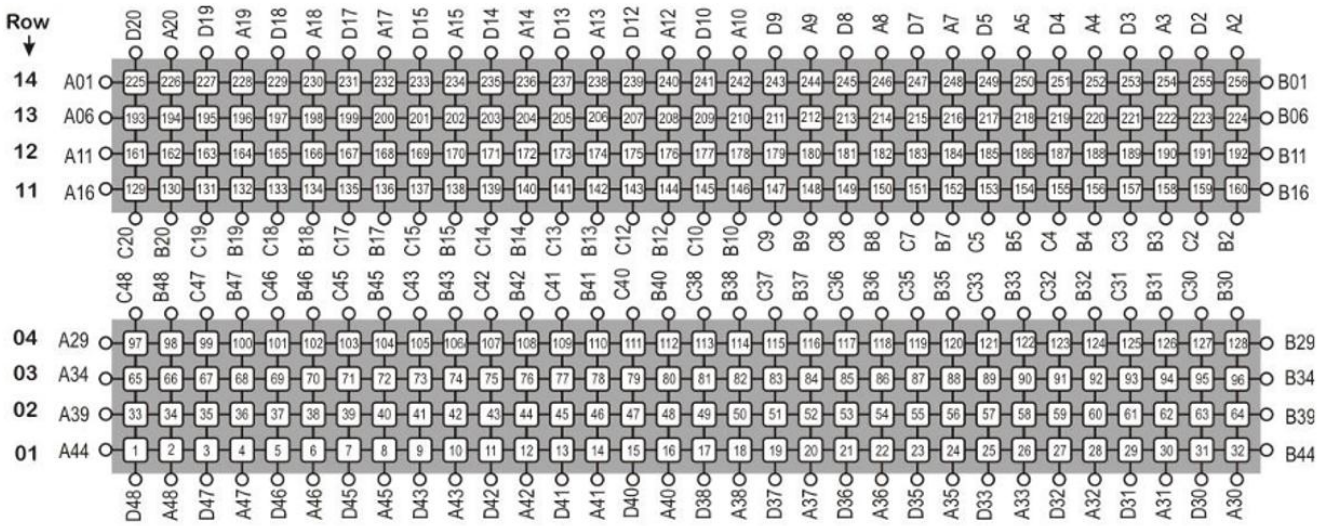


3. Types of switching modules: multiplexers, matrices and power switching

When talking about YAV switching modules, is about families such as:

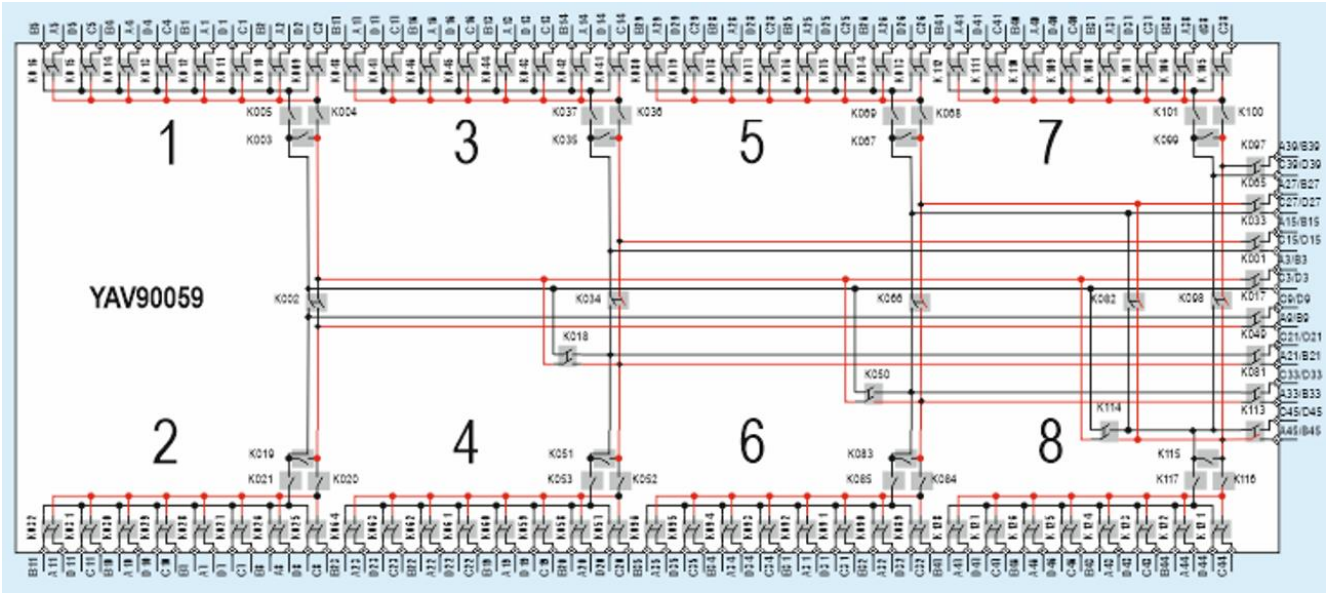
Matrices

They allow multiple inputs to be connected to multiple outputs (crosspoint / switching areas). For example, the series below shows matrix options with different configurations and ranges (including high voltage options in some models).



Multiplexers

Perfect for selecting one of many to an instrument (DMM, LCR, sources, loads, etc.) or for building switching trees. There are modules with configurable banks and different current / power capacities.



High current switching and power distribution

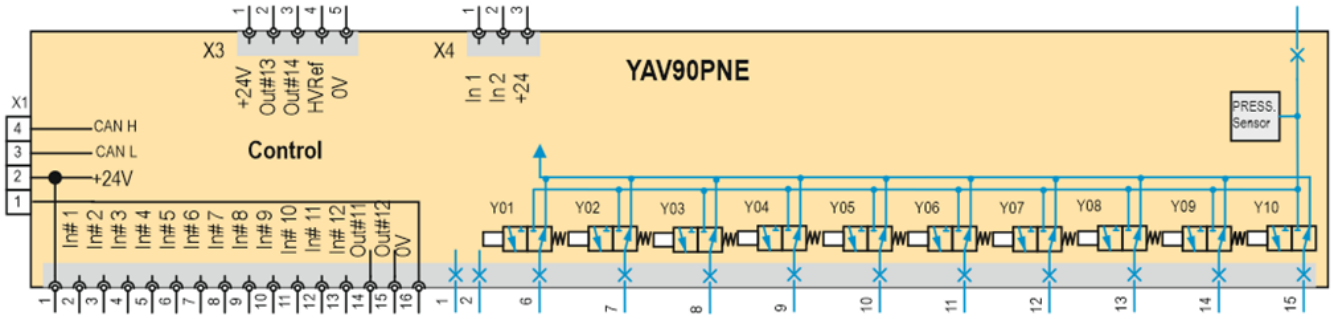
When the DUT needs high current power supplies, loads or switching, modules such as power distribution units and high current relays are the right option. For example, there are units that indicate up to 10A and switching voltage up to 250VAC/DC (depending on the module), with functionalities such as safety enable / inhibit and even current measurement via shunt in some cases.

This range allows to build a robust test matrix without having to use ad-hoc designs for each project, especially in low volume / high mix environments.

Pneumatics

The provision of a pneumatic subsystem within the test system significantly expands the possibilities of automating it:

- Activation of pushbuttons, switches, keys
- Fixation of the DUT
- Activation of pneumatic test tips that should be connected only during a certain test
- Pneumatic PASS / FAIL markers
- Cooling of power modules



ISP (Flash Memory Programming)

Only professional Flash programmers ensure the reliability required for a test system. Its cost is high, but essential in end-of-line production testing. On the other hand, its efficiency is reduced when the programming wiring is long. The YAV90FR2 module can program up to 8 devices in parallel.

4. Technical advantages (the ones you really notice on the test bench)

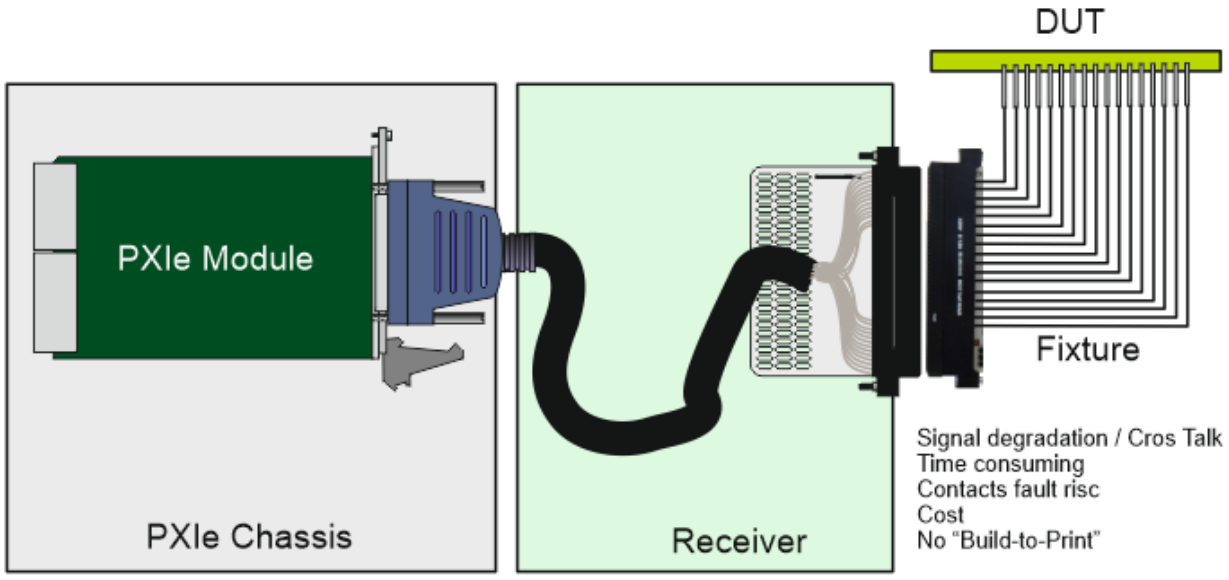
Signal integrity and reading accuracy

The key benefit is that by reducing cabling (and especially long runs) you get:

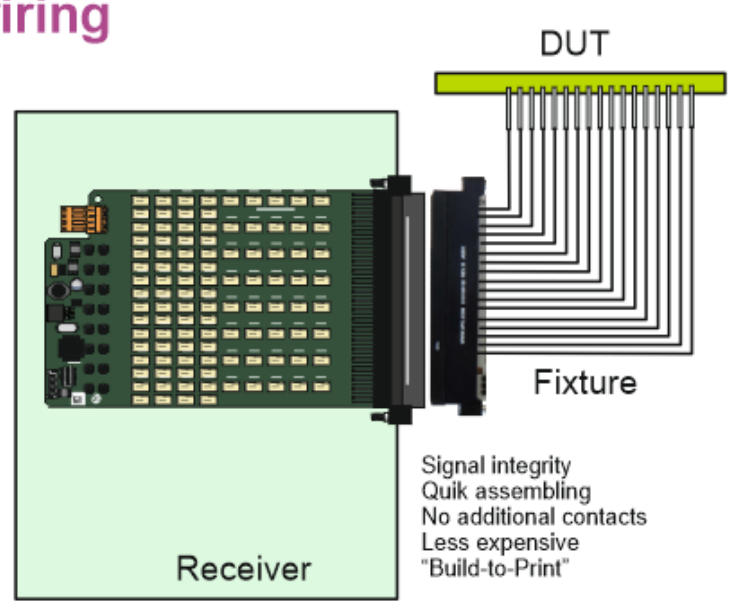
- better signal integrity
- more consistent and accurate readings
- less sensitivity to noise and EMI/EMC
- no variability between different test platforms

This is critical when you make measurements:

- high impedance (errors due to leakage currents and capacitances)
- low level (mV/µA)
- timing (latching, edges, digital)
- or RF (where every connector and every cm of coax counts)



PXI wiring

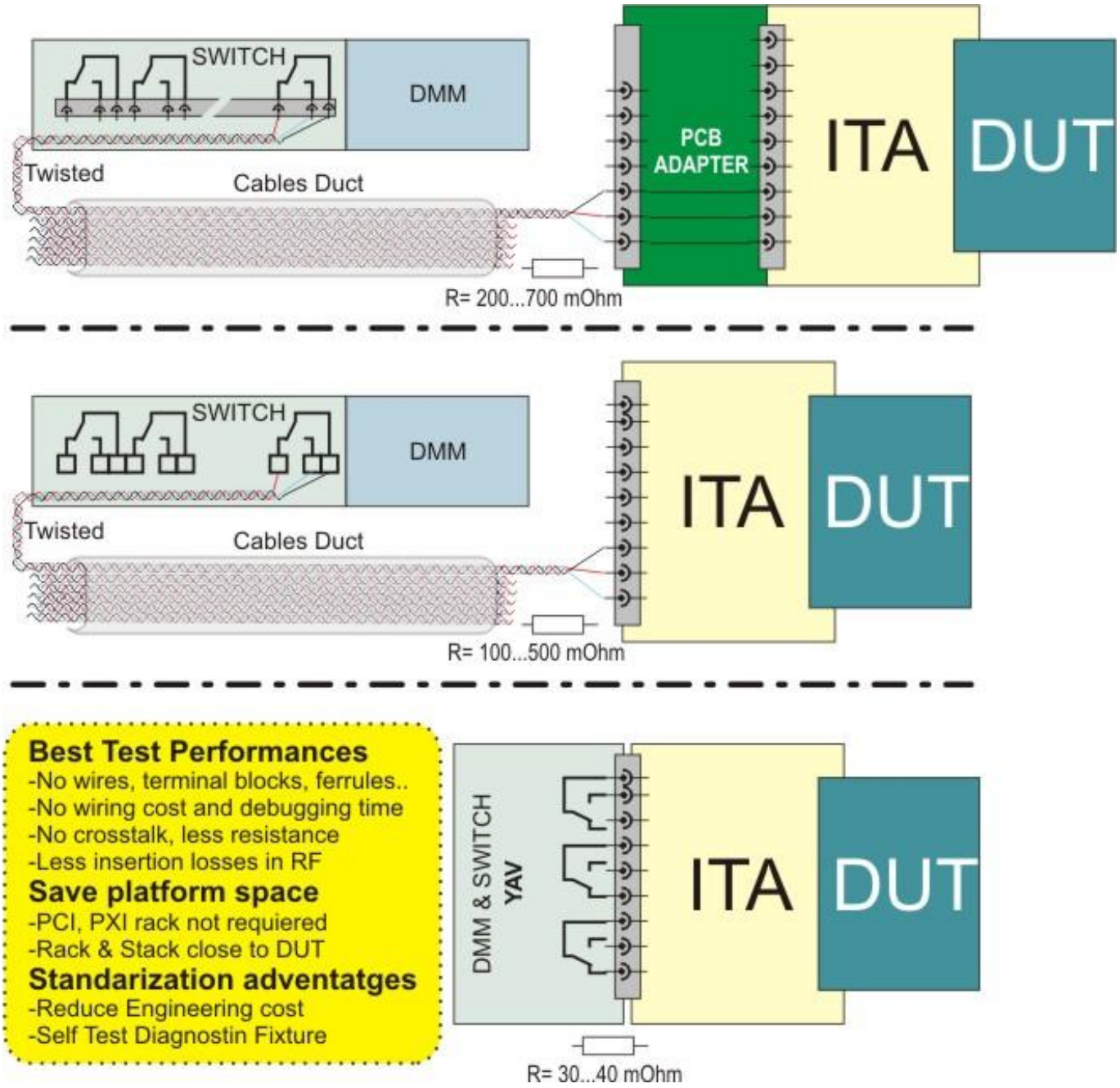


YAV = No wiring

Less latency and less dead time

When the switching is well positioned and the path is short, the system needs less time for the signal to stabilize after switching. This can translate into:

- shorter test cycles
- higher throughput
- fewer retries due to unstable measurements



Modularity and scalability

The YAV catalog covers many standard functions. You can start with the minimum (e.g. a multiplexer and a power module) and grow when the product or test plan requires it, without redesigning everything.

Fully distributed control

In PXI-based systems, the modules need the bus and can only be installed inside the chassis. YAV modules are usually installed in the tool receiver or can even be installed inside the Fixture, since they only need 4 wires for power and the CAN bus. This feature provides the advantage of being able to meet specific needs for a given product by simply including additional modules inside the fixture itself.

More industrial diagnostics and maintenance

When the switching is modular, maintenance is no longer hunting for cables:

- replace a module,
- revalidate,
- and return to production

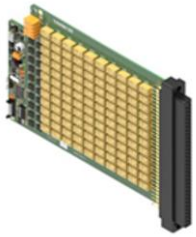
In addition, some 6TL approaches highlight the value of test, identification and maintenance routines associated with the ecosystem (documentation / software depending on the solution).

All relays in the test systems have a mechanical and electrical life limitation and, together with the test needles, are finite-life elements. YAV Modules incorporate in their internal memory the history of cycles performed by each relay contact and this allows the prediction of their useful life. Each contact also accumulates the number of fast cycles (switching in time intervals of less than 50 ms), which serves to optimize the load of each contact, reducing the possibility that its early deterioration will render the entire test system useless.

The use of YAV Modules allows for rapid diagnostics of the complete test system. Each YAV module has an optional ITA self test adapter, to facilitate accurate and rapid diagnostics.

5. Economic advantages (where the ROI comes from)

This is where the project is usually decided. The technical reasons are clear, the economic ones too: the use of YAV Modules represents a saving of more than 40%.

YAV Module		  	PXI Chassis slot PXIe Module Interface cables Mass Interconnect module

Direct savings in wiring and assembly hours

Less wiring means:

- less material (cables, terminals, labels, cable glands)
- fewer engineering and assembly hours
- fewer human errors (reverse wiring, pinouts, etc.)

This point is explicitly mentioned as a cost reduction factor when a large amount of cable is eliminated and maintenance is simplified.

Another important point: YAV Modules are installed on the front of the tool receiver and with only two Allen screws. The wiring interfaces are installed from the rear, relatively easy to assemble in construction but extremely difficult for maintenance.

Fewer incidents and fewer downtimes

In production, many failures are not electronics: they are contacts, connectors and cables. If you reduce interconnection points and lengths, you reduce:

- false NOKs
- troubleshooting time
- retests
- and line outages

Reuse and standardization

Modularity allows you to reuse a common switching base between different test programs. This:

- shortens the time to industrialization
- reduces inventory of one-off parts
- makes it easier to have standard spare parts

Instrument park optimization

With a good switching/multiplexing layer, you can often:

- reduce the number of duplicate instruments
- share DMM/ LCR / sources / loads between more test points
- maintain performance (if the path design is correct)

6. When it makes more sense to use YAV (typical cases)

- **Multiple test systems for the same products.**

In mass productions or distributed in different production plants it is imperative that the results obtained are always the same. This is practically impossible to achieve when we have connectors and wiring, since the cross-talk will affect all the measurements to a greater or lesser extent.

- **Low/mid volume production with variants**

When you have many references and flexibility is key, a library of standard modules speeds things up a lot. The cost of implementing the test system with YAV modules is much lower and the investment is completely open and usable in any other test system.

- **Tests with power + measurement**

When you need to switch supplies, loads and measure at the same time (e.g. current with shunt, safety enable, without re-wiring).

- **Fixturing that suffers from maintainability**

If today most of the time is spent repairing/validating wiring, the leap to modularity tends to pay off quickly.

- **How much should the cost be amortized in limited production batches**

Functional testing at the PCB or closed product level is essential, but the quantities do not always ensure the amortization of systems limited by the system capabilities. With YAV modules, the operating capabilities of the test system can be quickly reconfigured, without rejecting wiring.

7. Practical recommendations for implementation (to avoid surprises)

1. Define the switching architecture first: multiplexer vs matrix vs tree combination (topology affects you as much as the module).
2. Separate dirty and clean paths: power and weak signal, to avoid coupling.
3. Plan self-test and diagnostics from the beginning: it saves you hours when there is a tired relay or a degraded contact.
4. Document the mapping (channels, netnames, pinouts) as if it were software: it is your fixture code.

Conclusion

6TL YAV Modules provide value when your real problem is not measuring, but connecting well: with less cable, more signal integrity, and a modular architecture that maintains and scales better. At a technical level, the gain is usually noticeable in stability and repeatability; at an economic level, in hours, incidents and reusability.

They are modules consolidated in the market for more than 20 years, used in, among other sectors, electronics, aeronautics and defense industries.