TF1100 - TwinCAT 3 Controller Redundancy

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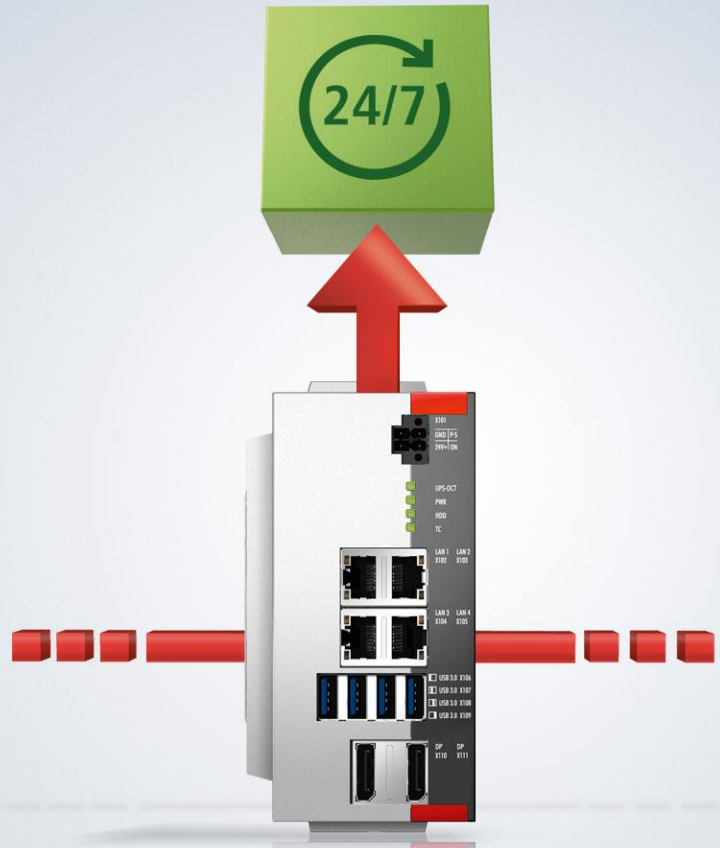

Contents

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Continuous and critical processes: No downtime allowed

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TwinCAT 3 Redundancy

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Redundancy…

- is important in sensitive control and communication processes
- can increase plant availability: if a component fails, its tasks are taken over by the redundant component to allow production to continue seamlessly

TwinCAT 3 Redundancy Overview

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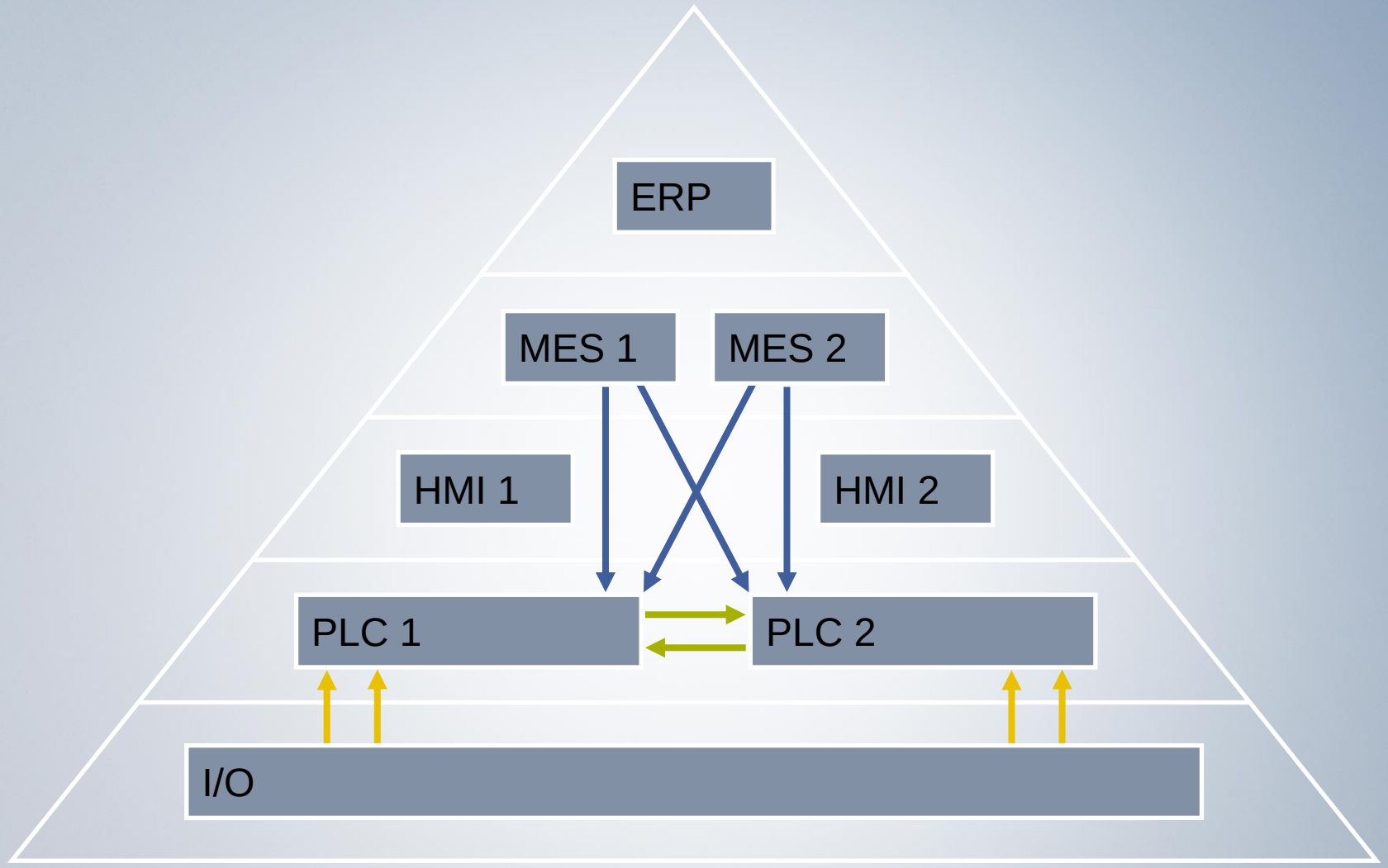

Comprehensive redundancy in automation

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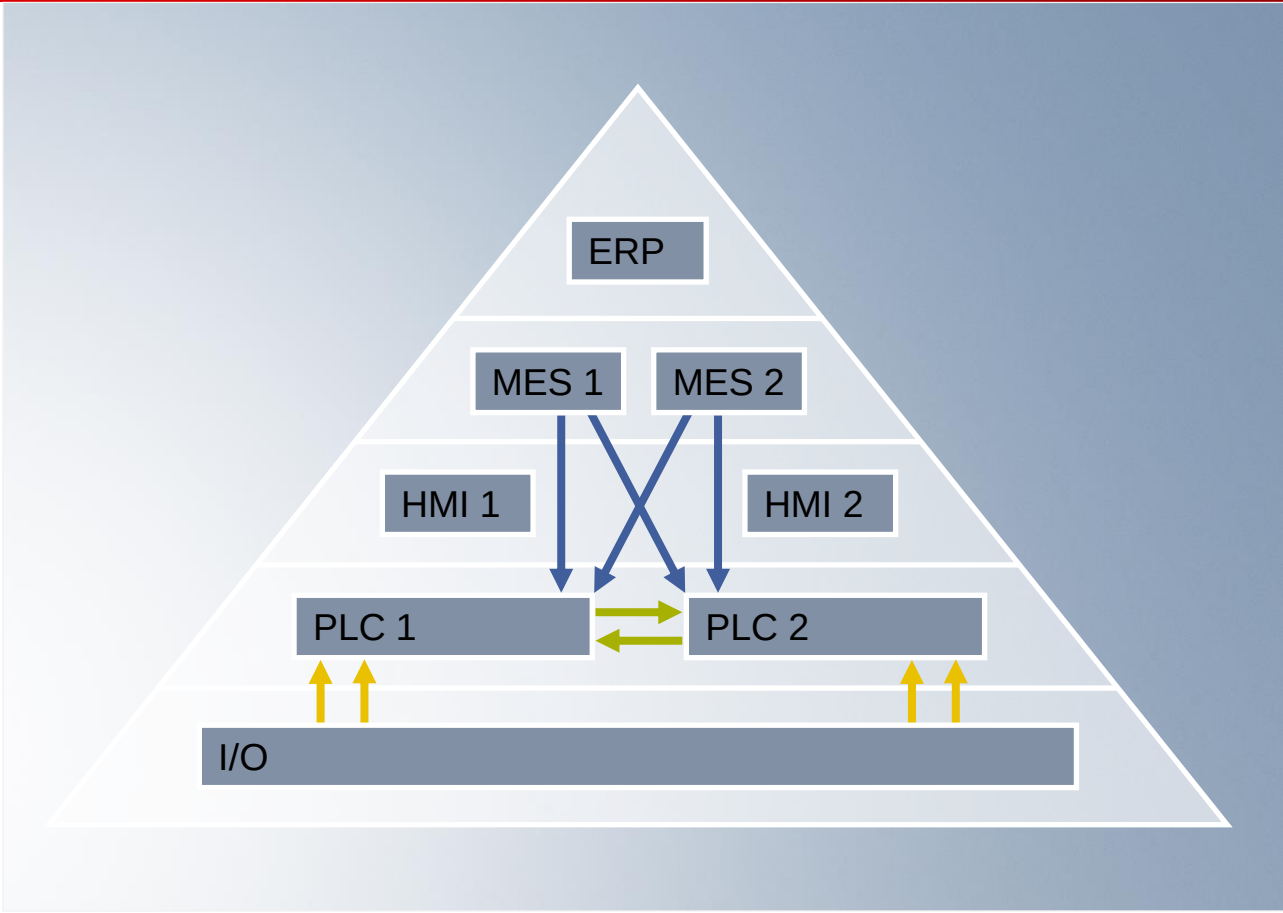
Components:

- TwinCAT 3 EtherCAT Redundancy
- TwinCAT 3 Parallel Redundancy Protocol (PRP)
- TwinCAT 3 Controller Redundancy



TF 6220 – TwinCAT 3 EtherCAT Redundancy

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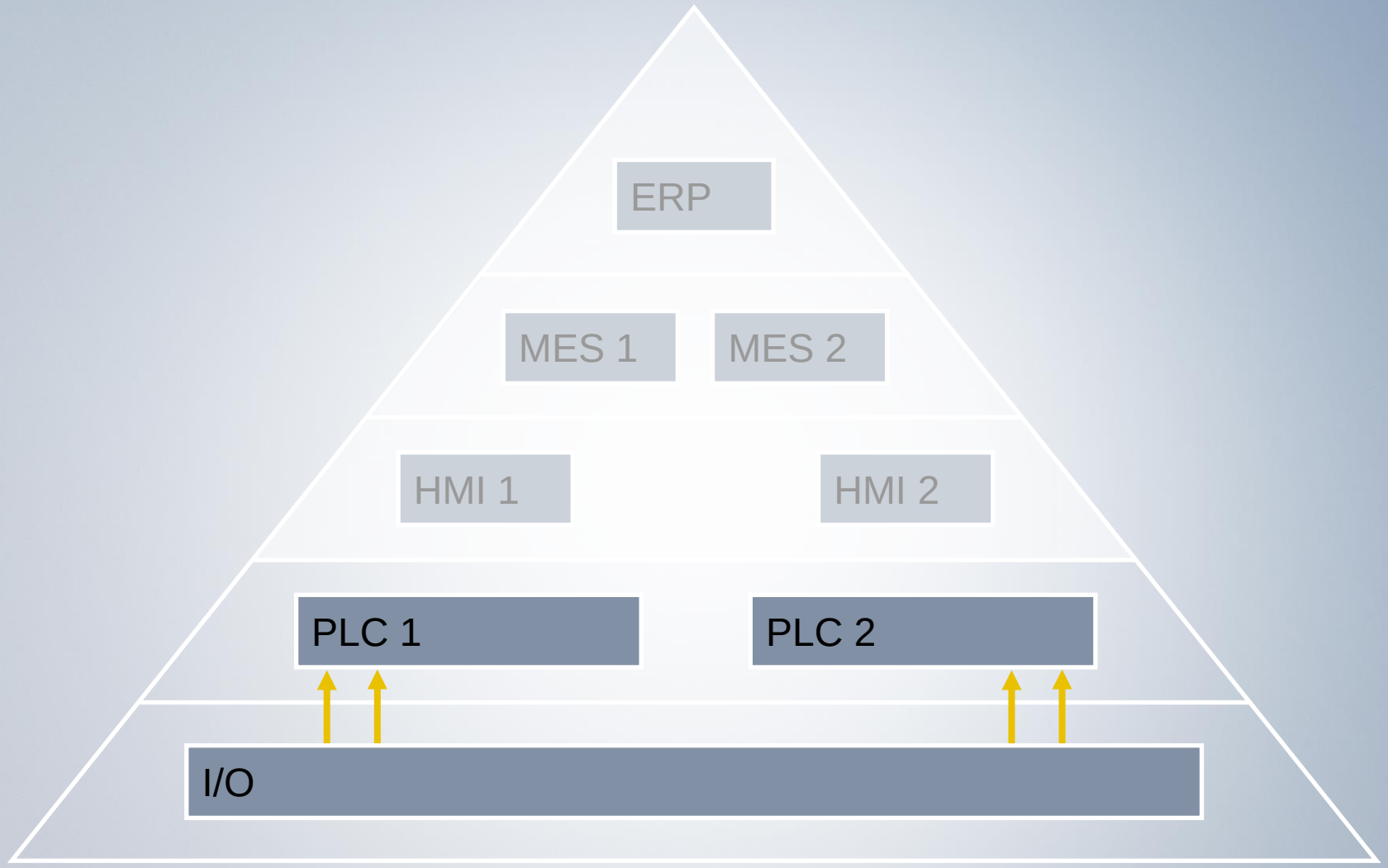

EtherCAT Redundancy

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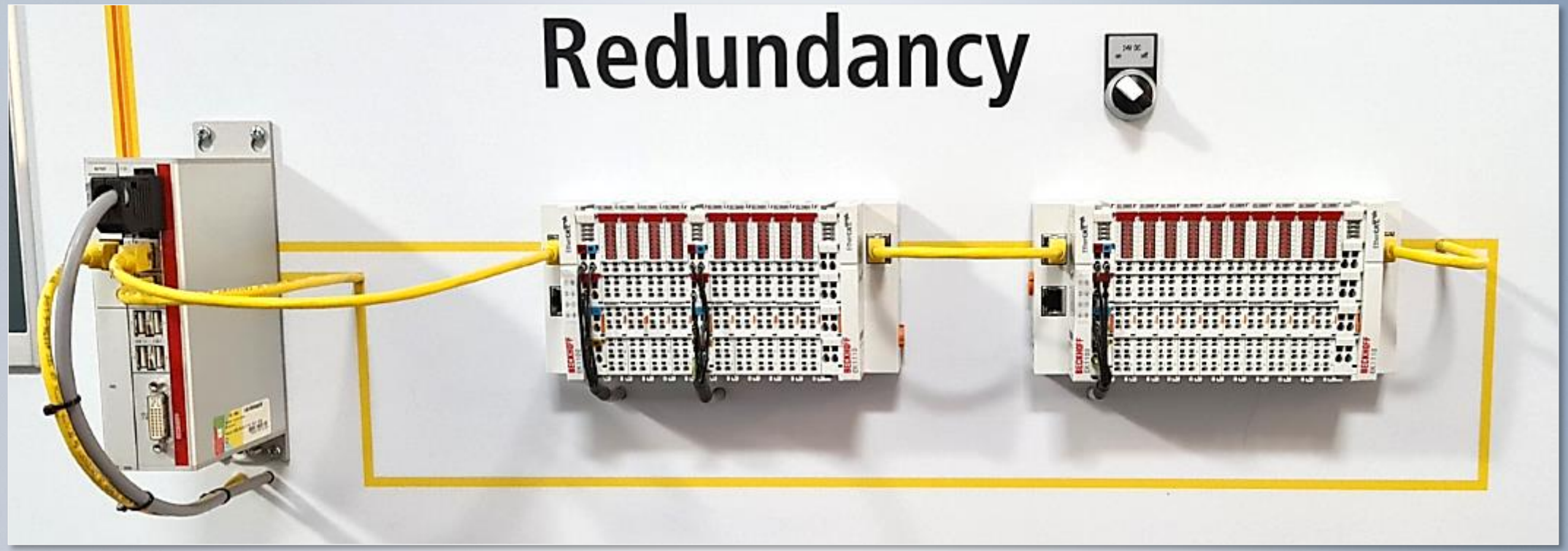

TF6230 – TwinCAT 3 Parallel Redundancy Protocol (PRP)

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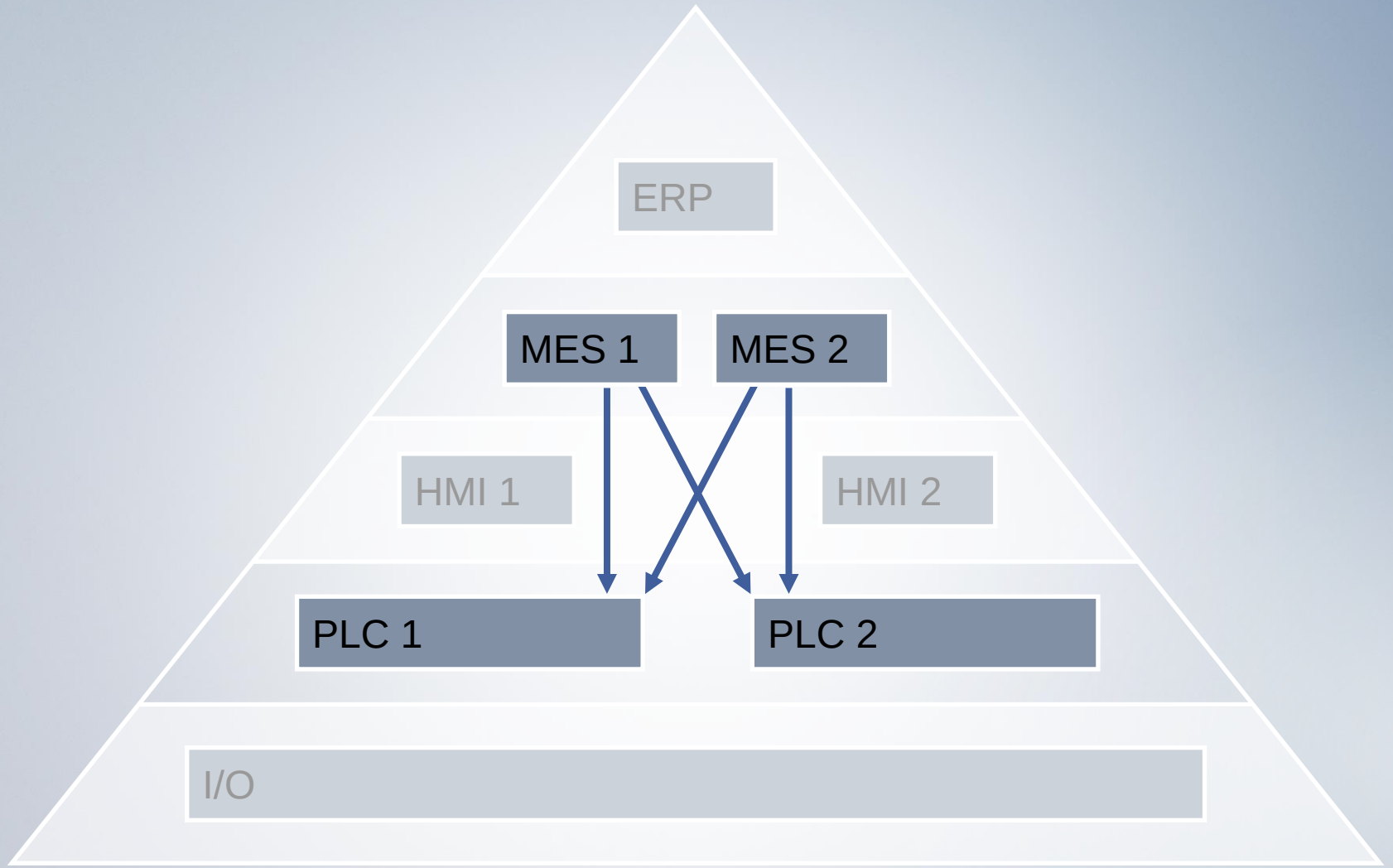

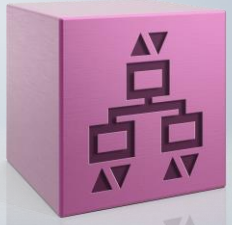

TF6230 – TwinCAT 3 Parallel Redundancy Protocol (PRP)

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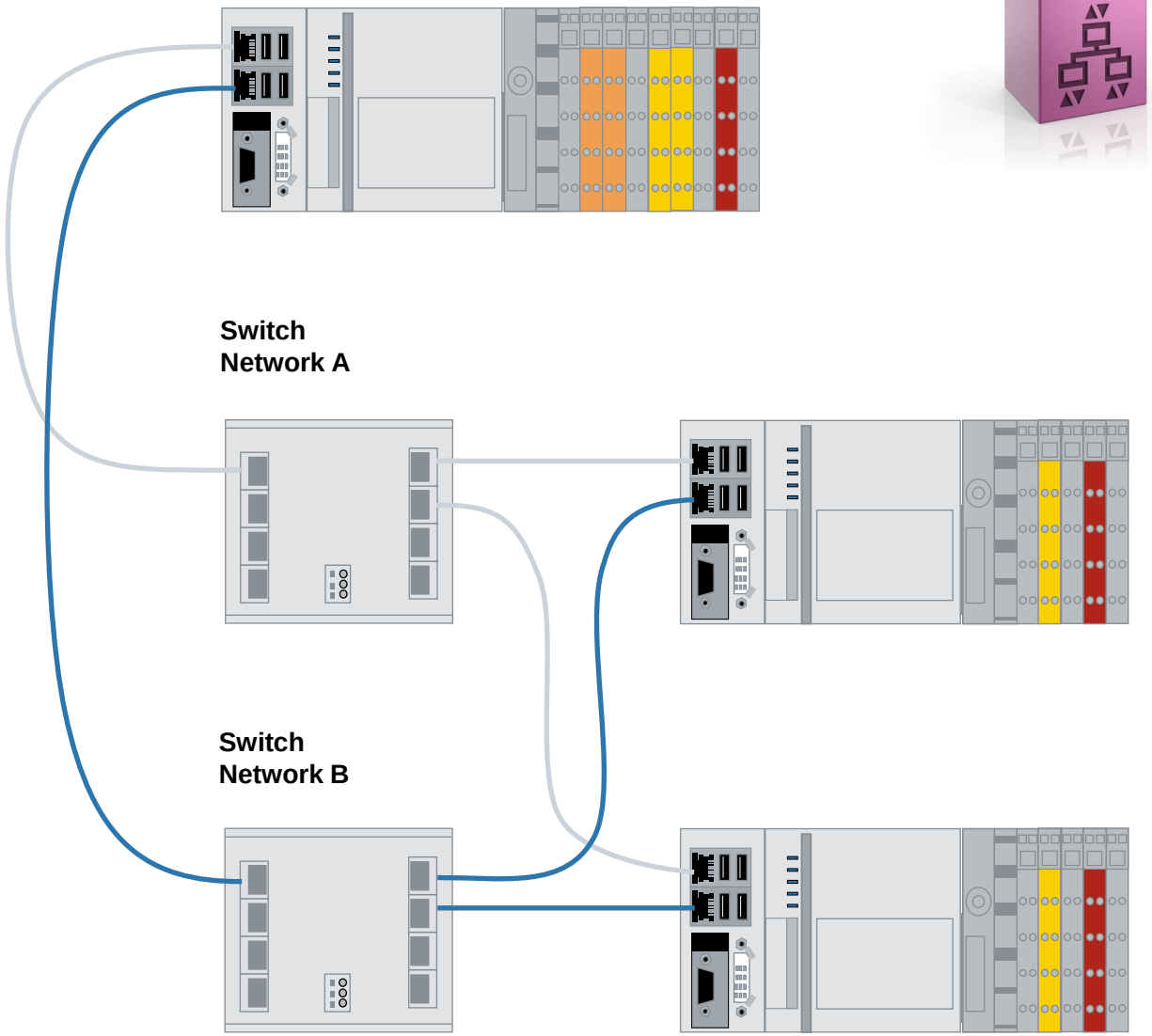
- PRP communicates via both networks
- separated (identical) IP networks of non-specialized switches
- All data is (usually) sent via both networks
- diagnostics within TwinCAT (via ADS)
- implementation as standardized in IEC 62439-3



TwinCAT Controller Redundancy

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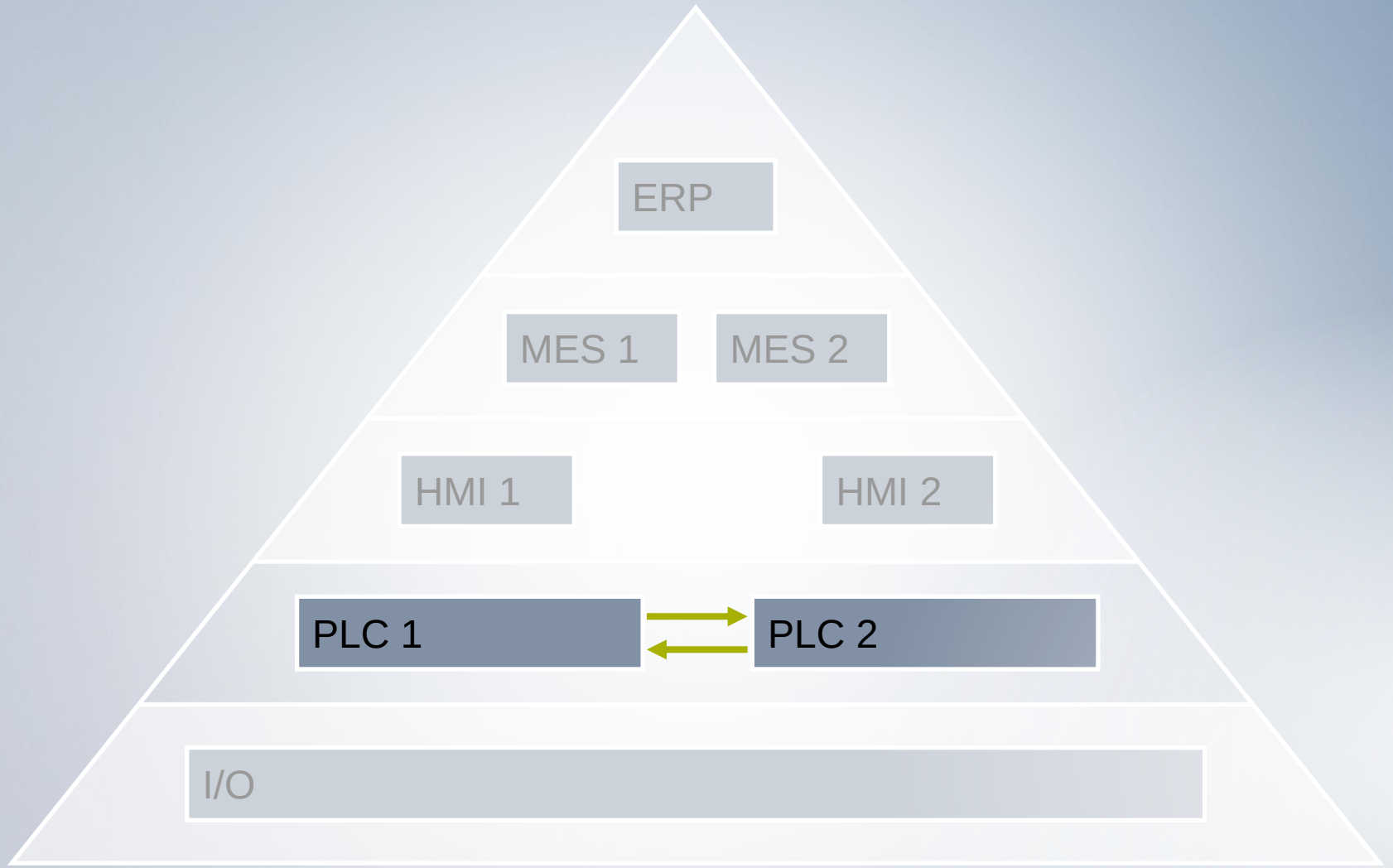

Redundancy Definition

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- **Cold redundancy**
  - is best suited to non-critical processes where down time is not a big concern and human intervention is possible.
- **Warm redundancy**
  - Design is suited to processes where time and response are important, but a momentary outage is still acceptable.
- **Hot redundancy**
  - While the architectures of warm and hot redundancy systems are very similar, unlike warm systems, hot redundancy systems provide instant process correction when a failure is detected. This makes it the best solution for critical processes which cannot experience an outage for even a brief moment.

Definitions from: www.automationit.com

Controller Redundancy Goals

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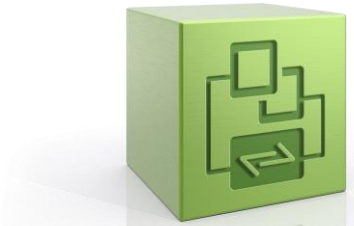
Goals:

- hot redundancy without any loss of control on takeover
- use of standard components
  - standard Beckhoff components
  - standard software – TwinCAT with extension
- engineering similar to non-redundant systems
  - same engineering tools
  - same capabilities (e.g. online change)
  - same communication to/from higher level



TwinCAT 3 Controller Redundancy

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TwinCAT Controller Redundancy Architecture

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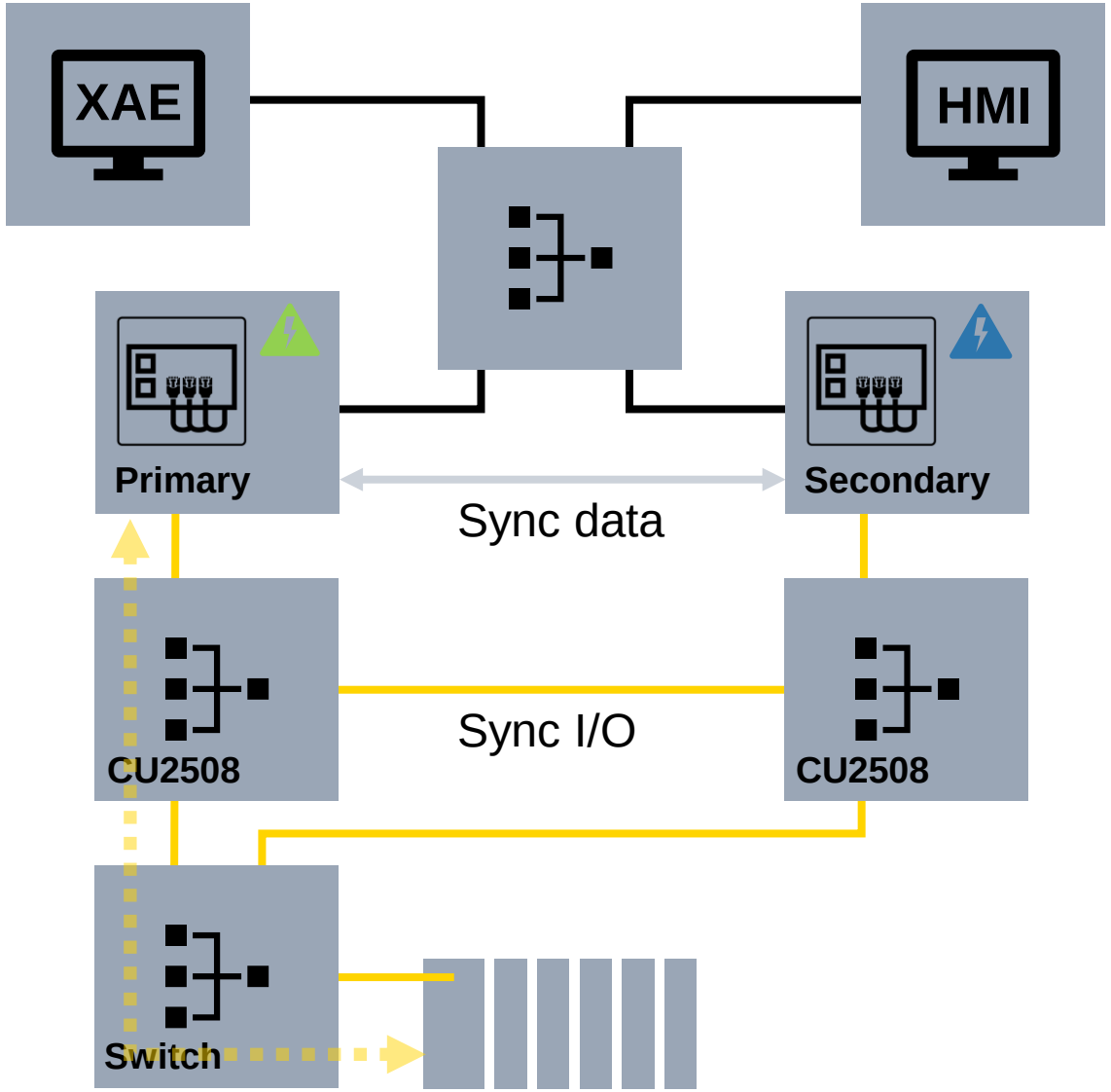

TwinCAT Controller Redundancy Architecture

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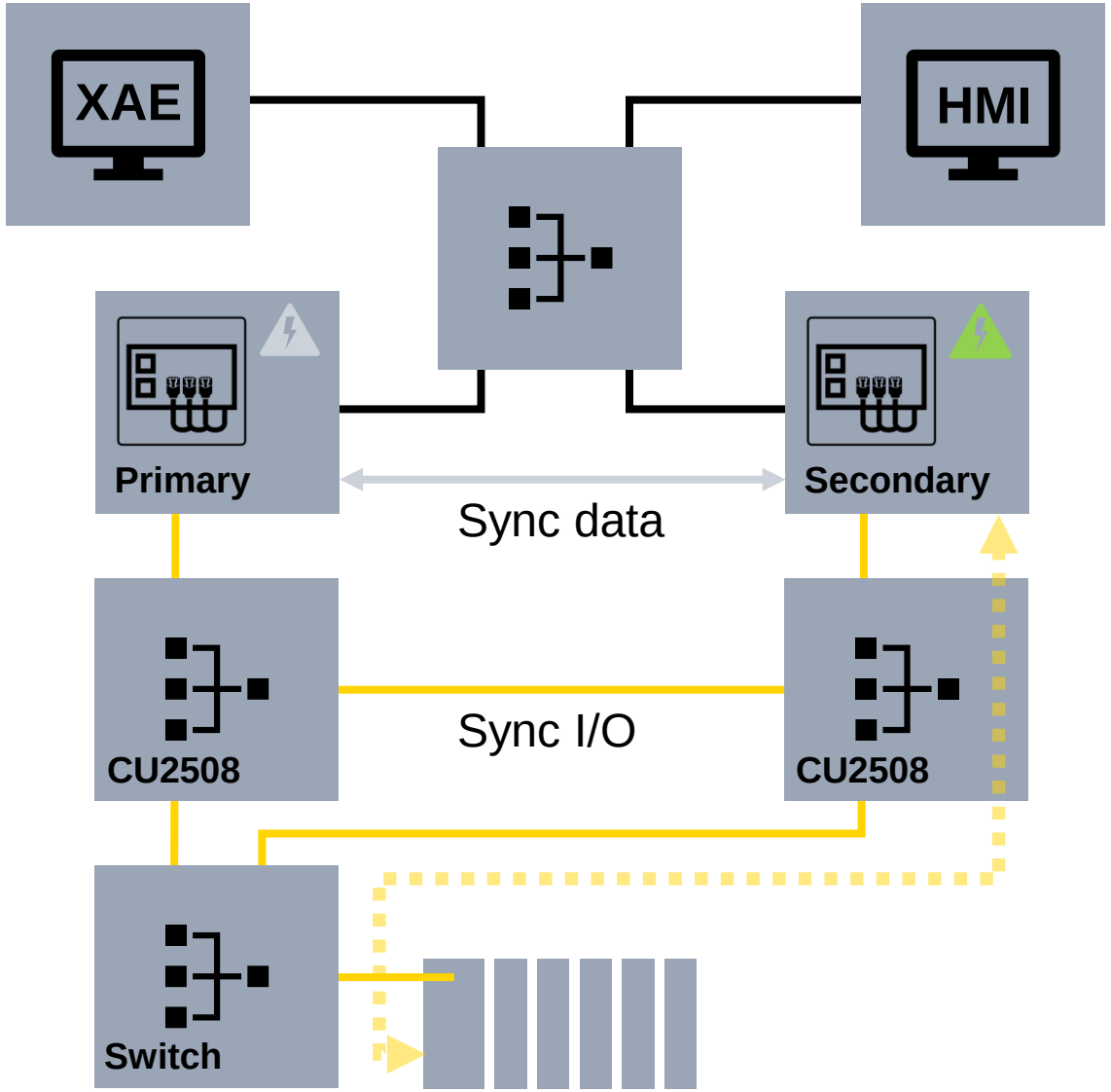

TwinCAT Controller Redundancy Hardware

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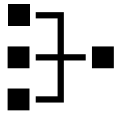
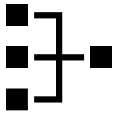
Hardware in use

		
2x standard IPC/Embedded PC ▪ of same type ▪ required network ports: 1x higher level communication 1x sync data 1x EtherCAT	CU2508 Real-time Ethernet port multiplier  **CU2508**	standard switch  **Switch**

Live Demo

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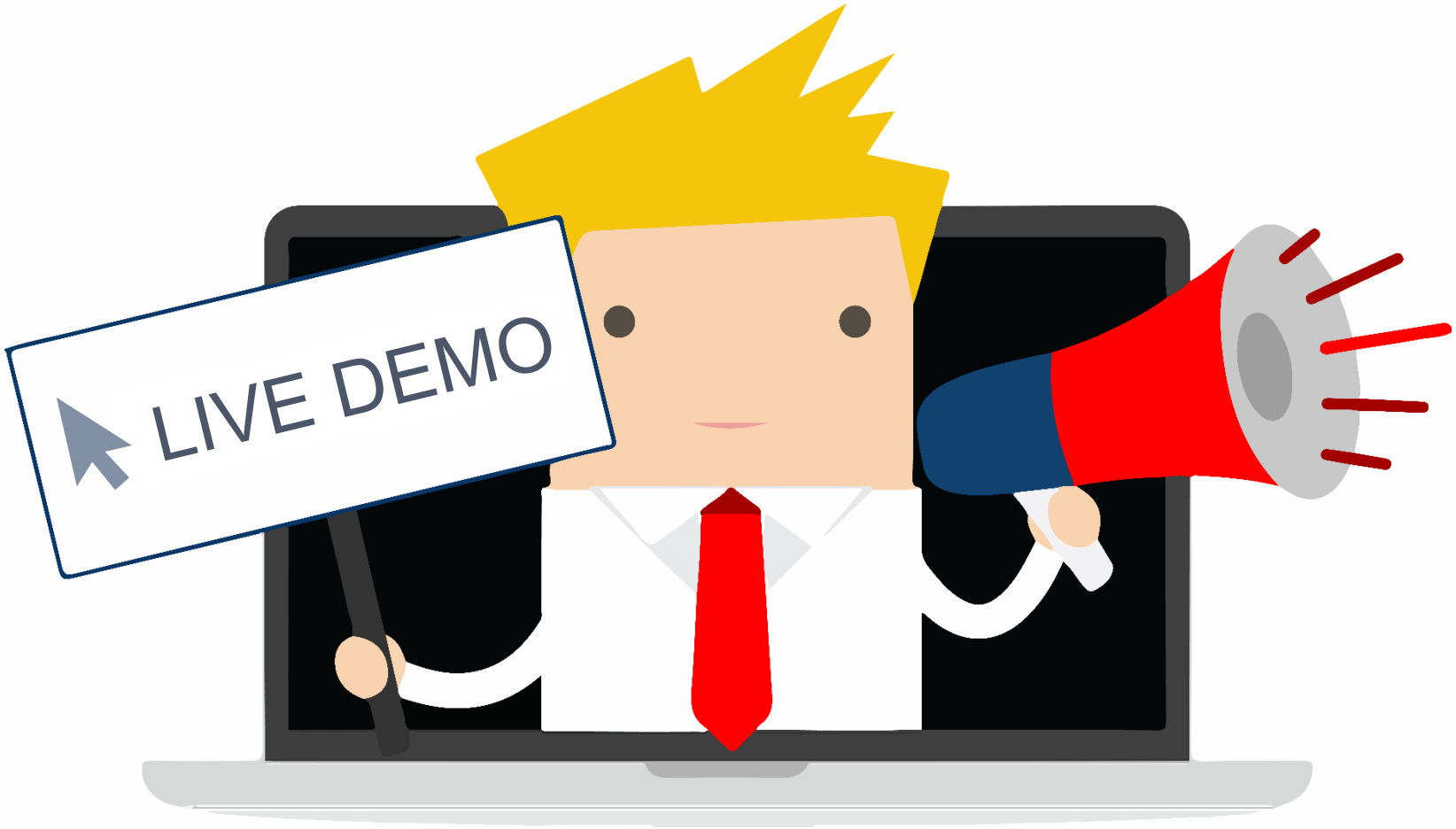

TwinCAT Controller Redundancy
Key Features

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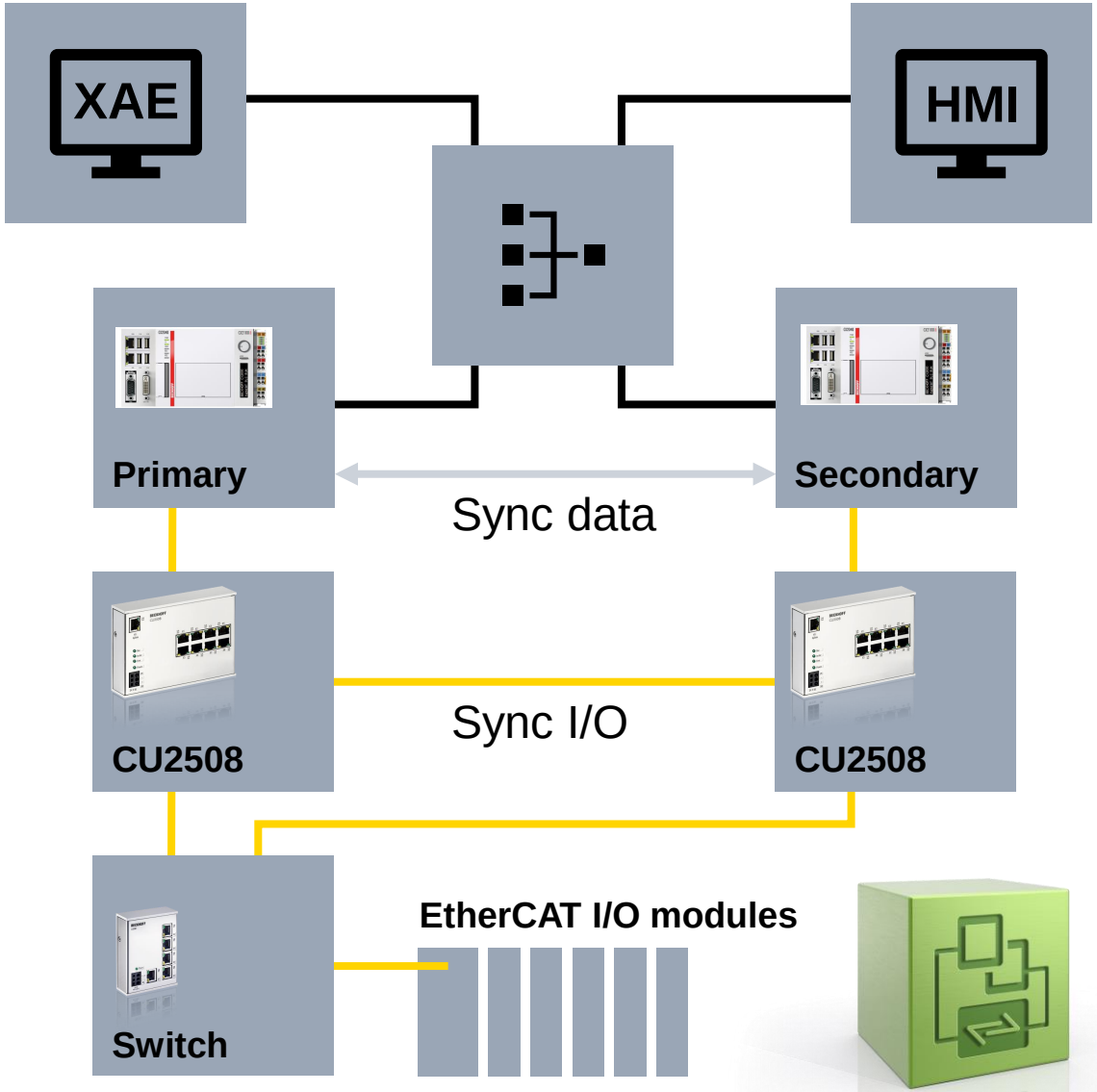
- fully synchronized PLC controllers
- no specialized hardware required
- standard Ethernet for synchronization
- easy to use:
  - transparent adressing: Primary/Secondary and Active/Standby
  - simple to engineer – no code, just configuration
  - diagnostic information about current state



TwinCAT 3 Redundancy
Overview

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Websites
https://www.beckhoff.com/redundancy
https://www.beckhoff.com/TF1100