

2.3.2 SC300E Functional Overview

A Triguard SC300E system has a fully triplicated architecture from input modules to output modules. All Triguard SC300E input and output modules interface to three isolated I/O communications buses, each being controlled by one of the three processor modules.

At the input modules, field signals are filtered and then split, via isolating circuitry, into three identical, signal processing paths. Each path is controlled by a microcontroller that co-ordinates signal path processing, testing and signal status reporting to its respective processor, via one of the triplicated I/O communications buses.

Each of the processors communicates with its neighbours via read only, serial communications links. The processors synchronise at least once per application logic execution cycle, and each reads the input, output and diagnostic status of its neighbours. Each processor correlates and corrects its memory image of the current state of the system using a 2-oo-3 software vote, logging any discrepancies found in a local diagnostic history table.

Each processor then executes its programmed application logic and sets its respective outputs, via the I/O communications bus, to the required state.

Commanded output states are received by an output module's microcontrollers which, using 2-oo-3 hardware voters, set the outputs to the field. Any discrepancy between a commanded output state and the field output is detected by the microcontrollers and reported to the appropriate processor.

All input and output modules can be configured to use a hot spare partner module. In the event of a fault on the main I/O module its duty can be taken over by the hot spare partner, allowing repairs to be effected.

In maximum configuration a single SC300E system can support a main chassis and 14 extension or remote chassis. Each chassis can be populated with 10 modules each containing up to 32 I/O channels, however, for safety configurations all outputs are configured for dual slot hot repair. Input modules may be configured for single slot hot repair only where the input configuration or process safety time allows.

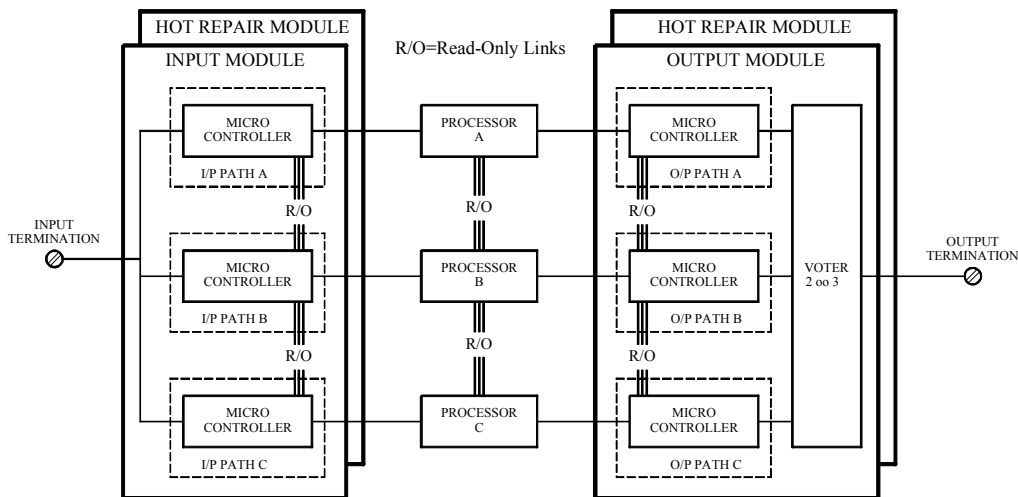


Figure 1 System Overview

2.3.3 Operating System

The SC300E's Real Time Task Supervisor (RTTS) is a derivative of the CS300 series operating system that has accrued over 10 million operational hours.

The RTTS is transparent to a user - an SC300E system is programmed like any standard industrial PLC, and controls the offline/start-up and online/continuous diagnostics.

2.3.4 Off-Line/Start-up Diagnostics

When an SC300E's processors are first powered up, the following diagnostic routines are executed: -

- initialisation of all RAM
- memory configuration and size checks
- RTTS and application logic copied to RAM
- all program checksums recalculated and checked
- configuration and checksums of neighbouring processors read and confirmed
- initialisation of synchronisation registers
- synchronisation registers of neighbouring processors read and verified

A processor will then pause, waiting for the other two processors to complete their start-up diagnostics.

At power up an SC300E system must have three healthy processors, otherwise the start-up diagnostics will prevent execution of the system application logic. The RTTS permits an SC300E system to operate 3-2-0 i.e. a system will continue to operate with one failed processor. For ESD safety configurations output modules are configured to de-energise their outputs when the second processor fails.

Replacement processors can be brought online using a warm start command. Warm start commands can be issued from a TriBuild workstation or by use of application logic. A newly installed processor will execute its start-up diagnostics, monitor the running processors' synchronisation registers and await a warm start command. At this point checksums will be confirmed and the new processor acquires I/O data tables and the application program from its neighbours and commences execution of its application logic.

13 Appendix 6 - TUV Approved Part Numbers and Revisions

13.1 Hardware Approvals.

Triguard SC300E – Hardware Components	Model No	Part No	Certification			
			AK5/6	SIL	EN 54	
Chassis	Chassis	001-1109-01	✓	3	✓	
Chassis	Chassis	001-1209-00-00	✓	3	✓	
Chassis Power Supply - 110/230Vac	PAC	031-1053-05-02	✓	3	✓	
Chassis Power Supply - 110/230Vac	PAC	031-1053-06	✓	3	✓	
Chassis Power Supply - 24Vdc	PDC24	031-1054-04-02	✓	3	✓	
System Modules						
Processor Module	MPP	001-1111-03-08	✓	3	✓	
Processor Module	MPP	001-1111-04-00	✓	3	✓	
Processor Module	MPP	001-1111-05-00	✓	3	✓	
Processor Module	MPP	001-1111-06-04	✓	3	✓	
Processor Module	MPP	001-1111-07-00	✓	3	✓	
Bus Buffer Module	MBB	001-1116-08-00	✓	3	✓	
Serial communications module - 4 port - RS232	MSR04XI	001-1103-04-00	I/F		✓	
Remote Bus Extender – Slave	++	MRB01XS	001-1130-04-00	✓	3	✓
Remote Bus Extender – Master	++	MRB04XM	001-1129-04-00	✓	3	✓
++ supported in RTTS 8.30-007 and above						
Digital Input and Output Modules						
32 channel analogue input module, isolated - 0/20mA	MAI32NAD	001-1145-02-00	✓	3	✓	
32 channel analogue input module, isolated - 0/20mA	MAI32NAD	001-1145-03-00	✓	3	✓	
32 channel analogue input module, isolated - 0/40mA	MAI32PAD	001-1147-02-00	✓	3	✓	
32 channel analogue input module, isolated - 0/40mA	MAI32PAD	001-1147-03-00	✓	3	✓	
32 channel analogue input module, isolated - 0/5Vdc	MAI32LAD	001-1113-05-00	✓	3	✓	
32 channel analogue input module, isolated - 0/5Vdc	MAI32LAD	001-1113-06-00	✓	3	✓	
32 channel analogue input module, isolated - 0/10Vdc	MAI32MAD	001-1143-04-00	✓	3	✓	