Honeywell

Safety Manager
Hardware Reference

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Location of Control Processor modules

The Controller chassis CPCHAS-0001 contains all Control Processor modules.

Table 5 on page 89 shows the location of the Control Processor modules in a non-redundant and a redundant Controller (as seen from the front of the cabinet). As you can see, all Control Processor modules are doubled in a redundant Controller configuration, with the exception of the Battery and Key switch module, which is shared by both Control Processors.

Table 5 Distribution of the various Control Processor modules in the Controller chassis

Redundant Controller								
Non-Redundant Controller								
CPU 1	COM 1 .1	COM 1 .2	PSU 1	BKM	CPU 2	COM 2 .1	COM 2 . 2	PSU 2
Legend:								
Item	**Description**						**See**	
CPU1	the processor module of the first Control Processor							
	QPP-0001 Quad Processor Pack						page 240	
	QPP-0002 Quad Processor Pack						page 253	
COM1.1	the first communication module of the first Control Processor							
	USI-0001 Universal Safety Interface, or						page 266	
	USI-0002 Universal Safety Interface, or						page 271	
	BLIND-COM Dummy Communication Module						page 275	
COM1.2	the second communication module of the first Control Processor							
	USI-0001 Universal Safety Interface, or						page 266	
	USI-0002 Universal Safety Interface, or						page 271	
	BLIND-COM Dummy Communication Module						page 275	
PSU1	the power supply module of the first Control Processor							
	PSU-240516 Power Supply Unit 24/5 Vdc, 16A						page 284	
BKM	the battery and key switch module of (both) Control Processor(s)							
	BKM-0001 Battery and Key switch Module						page 277	
CPU2	the processor module of the first Control Processor							
	QPP-0001 Quad Processor Pack						page 240	
	QPP-0002 Quad Processor Pack						page 253	

Table 5 Distribution of the various Control Processor modules in the Controller chassis *(continued)*

Redundant Controller		
Non-Redundant Controller		
COM2.1	the first communication module of the second Control Processor	
	USI-0001 Universal Safety Interface, or	page 266
	USI-0002 Universal Safety Interface, or	page 271
	BLIND-COM Dummy Communication Module	page 275
COM2.2	the second communication module of the second Control Processor	
	USI-0001 Universal Safety Interface, or	page 266
	USI-0002 Universal Safety Interface, or	page 271
	BLIND-COM Dummy Communication Module	page 275
PSU2	the power supply module of the second Control Processor	
	PSU-240516 Power Supply Unit 24/5 Vdc, 16A	page 284

In case of a non-redundant Controller, the unused positions in the Controller chassis (CPU2, COM2.1, COM2.2, and PSU2 are covered by an BLIND-CPS plate (see Figure 44 on page 88).

For each Quad Processor Pack, room is provided for two communication modules in the Controller chassis. Table 6 on page 90 shows possible locations for different combinations of communication modules.

Note

If only one communication module is used in a Control Processor, the module is placed in the COM1 slot (see Table 6 on page 90). A blind communication module (BLIND-COM) should be placed in all unused communication slots.

Table 6 Possible locations of communication modules in the Controller chassis

Number of modules	COM1 Slot	COM2 Slot
0	BLIND-COM	BLIND-COM
1	USI-0001 or USI-0002	BLIND-COM
2	USI-0001 or USI-0002	USI-0001 or USI-0002

Location of Control Processor modules

The Controller chassis CPCHAS-0002 contains all Control Processor modules.

Table 16 on page 118 shows the location of the Control Processor modules in a redundant Controller (as seen from the front of the cabinet). As you can see, all Control Processor modules are doubled in a redundant Controller configuration, with the exception of the Battery and Key switch module, which is shared by both Control Processors.

Table 16 Distribution of the various Control Processor modules in the Controller chassis

Redundant Controller								
CPU 1	COM 1.1	COM 1.2	PSU 1	BKM	CPU 2	COM 2.1	COM 2.2	PSU 2
Legend:								
Item	**Description**						**See**	
CPU1	the processor module of the first Control Processor							
	QPP-0002 Quad Processor Pack						page 253	
COM1.1	the first communication module of the first Control Processor							
	USI-0001 Universal Safety Interface, or						page 266	
	USI-0002 Universal Safety Interface, or						page 271	
	BLIND-COM Dummy Communication Module						page 275	
COM1.2	the second communication module of the first Control Processor							
	USI-0001 Universal Safety Interface, or						page 266	
	USI-0002 Universal Safety Interface, or						page 271	
	BLIND-COM Dummy Communication Module						page 275	
PSU1	the power supply module of the first Control Processor							
	PSU-240516 Power Supply Unit 24/5 Vdc, 16A						page 284	
BKM	the battery and key switch module of (both) Control Processor(s)							
	BKM-0001 Battery and Key switch Module						page 277	
CPU2	the processor module of the first Control Processor							
	QPP-0002 Quad Processor Pack						page 253	
COM2.1	the first communication module of the second Control Processor							
	USI-0001 Universal Safety Interface, or						page 266	
	USI-0002 Universal Safety Interface, or						page 271	
	BLIND-COM Dummy Communication Module						page 275	

Table 16 Distribution of the various Control Processor modules in the Controller chassis *(continued)*

Redundant Controller		
COM2.2	the second communication module of the second Control Processor	
	USI-0001 Universal Safety Interface, or	page 266
	USI-0002 Universal Safety Interface, or	page 271
	BLIND-COM Dummy Communication Module	page 275
PSU2	the power supply module of the second Control Processor	
	PSU-240516 Power Supply Unit 24/5 Vdc, 16A	page 284

For each Quad Processor Pack, room is provided for two communication modules in the Controller chassis. Table 17 on page 119 shows possible locations for different combinations of communication modules.

Note

If only one communication module is used in a Control Processor, the module is placed in the COM1 slot (see Table 17 on page 119). A blind communication module (BLIND-COM) should be placed in all unused communication slots.

Table 17 Possible locations of communication modules in the Controller chassis

Number of modules	COM1 Slot	COM2 Slot
0	BLIND-COM	BLIND-COM
1	USI-0001 or USI-0002	BLIND-COM
2	USI-0001 or USI-0002	USI-0001 or USI-0002

Control Processor modules

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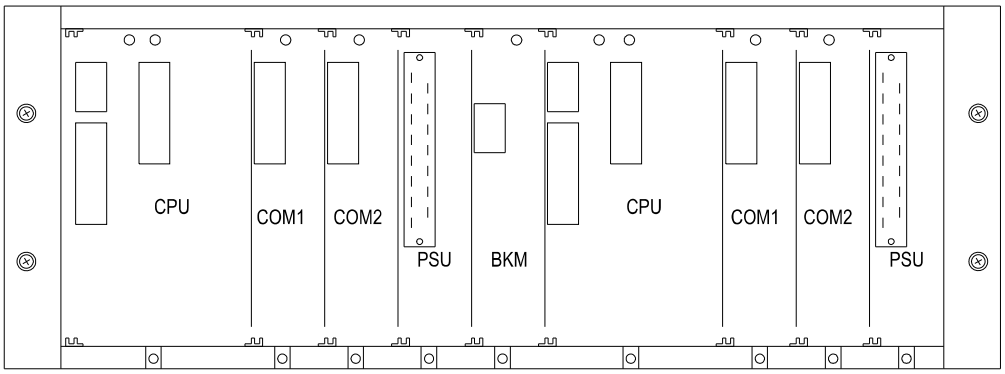
This chapter describes the following Control Processor modules:

Module		See
QPP-0001	Quad Processor Pack	page 240
QPP-0002	Quad Processor Pack	page 253
USI-0001	Universal Safety Interface	page 266
USI-0002	Universal Safety Interface	page 271
BLIND-COM	Dummy communication module	page 275
BKM-0001	Battery and Key switch Module	page 277
PSU-240516	Power Supply Unit 24/5 Vdc, 16 A	page 284

General info about Control Processor modules

Each Safety Manager Control Processor module is located in a pre-determined slot in the Controller chassis (see section “CPCHAS-0001” on page 87 or “CPCHAS-0002” on page 116). Connectors and earth/keying pins in the backplane ensure they can only be placed in the slot reserved for that type of Control Processor module (see Figure 150 on page 238).

Figure 150 Front view of an empty Controller chassis



All connections and communication from and to Control Processor modules run via the Controller backplane (see section “Controller backplane CPB-0001” on page 91).

Table 34 available Control Processor modules and their functionality

Control Processor module		Functionality
QPP-0001 QPP-0002	Quad Processor Pack Quad Processor Pack	• two -synchronous- processors • flash memory for system and application program • RAM with battery backup (battery located in BKM-0001) • data comparators for the processors and their memory • a redundant communication link with the other Control Processor • data exchange with its communication modules • watchdog (fully testable) with: - minimum and maximum execution time monitor - memory error handler - 1oo2D functionality - 24V and 5V monitoring - emergency Shut Down Input (24V) - two outputs (for non-redundant resp. redundant IO) • four IObus drivers • diagnostics display • temperature monitors • real time clock
USI-0001 USI-0002	Universal Safety Interface Universal Safety Interface	• two 10/100 Mb Ethernet channels • two general purpose SCC channels
BKM-0001	Battery and Key switch Module	• backup batteries for CP1 and CP2 • Reset key switch • Force Enable key switch • three general purpose inputs (24 VDC)
PSU-240516	Power Supply Unit 24/5 Vdc, 16 A	• dual 5 V supply (out of 24 VDC) for: - Control Processor and redundant IO - non-redundant IO

USI-0001

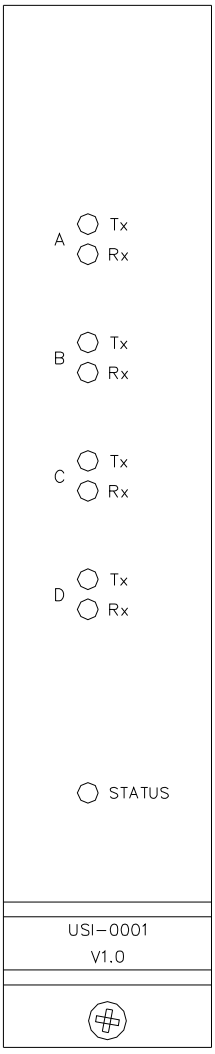
Universal Safety Interface

Description

The USI-0001 communication module handles Ethernet and Serial communication with external devices, e.g. Experion™ PKS and Safety Builder. It is located in the Controller chassis (see section “CPCHAS-0001” on page 87 or “CPCHAS-0002” on page 116).

Figure 161 on page 266 shows the front view of the USI-0001 module.

Figure 161 Front view of the USI-0001 module



The main function of communication modules is handling the communication to and from external devices and other Safety Managers. The USI-0001 has four (4) independent communication channels. See Table 43 on page 267 for the relevant details.

Table 43 The communication channels of the USI-0001 module

Channel	Description	Connector	Connects to	Communication cable
A	10/100 Mb Ethernet[1] Communication Channels	RJ45	UCOM-HSE	CCI-HSE-01
B				
C	General purpose Serial Communication Channels	10-pins AMP	DCOM-232/485	CCI-UNI-01
D				

1 The Ethernet interfaces are auto-ranging, they automatically select between 10 and 100 Mb.

Furthermore, the USI-0001 communication module acts as hardware firewall, protecting the safety functions within Safety Manager.

The module consists of the following items:

- A Motorola 8260 communication processor.
- EEPROM to store specific module data, such as the two MAC-addresses and the hardware revision number.
- 8 Mbyte Flash memory to store the system and application program. The flash content is copied to SRAM at startup and is executed from there. The flash content can be updated without removing the USI-0001 from the Controller chassis.
- 4 Mbyte Local SRAM (with Error Detecting and Correcting logic) for system and application program and information.
- 256 kilobyte shared RAM for data exchange between the USI-0001 and the Control Processor.
- Two dual-speed fast ethernet transceivers
- Two general purpose serial communication controller channels.

LED Indicators

Table 44 on page 268 lists LEDs that are visible at the front side of the USI-0001 module.

Table 44 LED indicators of the USI-0001 module

LED	Status	Description
Tx N[1]	Green	Data is being transmitted on channel N*.
	Off	No data is being transmitted on channel N*.
Rx N*	Green	Data is being received on channel N*.
	Off	No data is being received on channel N*.
STATUS	Green	No hardware errors are detected in the module.
	Red	One or more hardware errors are detected in the module.
	Off	Power down or booting

1 N = 1, 2, 3 or 4.

Reset mechanism

The USI-0001 module resets hardware via the following mechanisms:

- Power-up or power-dip.
- If the Quad Processor Pack (key switch) goes in ‘STOP’ mode.
- If the Quad Processor Pack generates a COMmunication RESet.

The communication *channels* are reset (go offline) if:

- the module resets, or
- the dedicated watchdog times out.

Note:

A dedicated watchdog has been added to prevent a possible communication lock-out on the communication lines, if the processor on the USI-0001 gets a fatal error (e.g. program hang-up or loss of clock).

Hot swap

The USI-0001 module has ‘hot swap’ features.

This means that the module may be placed or removed in a running system. The application program will not be interrupted by these actions.

Additional specifications

The USI-0001 module has a galvanic isolation of:

- ≥ 2.5 kVdc between the 5 Vdc and the Ethernet signal.
- ≥ 1.5 kVdc between the Ethernet signal and the casing of the USI-0001.
- ≥ 1.5 kVdc between the 5 Vdc and the casing of the USI-0001.

If a memory error in the USI-0001 module is detected, the Quad Processor Pack will get an interrupt.

The USI-0001 module has a power-up self-test (diagnostics) phase for testing of the following components:

- Processor address- and data registers
- Local RAM
- Shared RAM
- Exception Handling
- Software integrity

Power-up self-tests are required to reduce the risk of defective hardware or corrupted software being used.

Technical data

The USI-0001 has the following specifications.

General	Type numbers[1] [2]:	FS-USI-0001 V1.2
		FC-USI-0001 CCV1.2
	Operating temperature:	–5°C — +70°C (+23°F — +158°F)
	Storage temperature:	–40°C — +85°C (–40°F — +185°F)
	Relative humidity:	10 — 95% (non condensing)
	Approvals:	CE, TUV, UL, CSA, FM
Power	5 V supply voltage:	5 Vdc ±5%
	5 V supply current:	max 1.2A
Physical	Dimensions:	176 × 35.2 × 212 mm (H × W × D) 6.93 × 1.4 × 8.35 in (H × W × D)
	Weight:	0.7 kg

1 FS-type modules are non conformal coated modules.
FC-type modules are conformal coated modules. Conformal coated modules have the letters "CC" preceding the version number.

2 Modules with suffix code V1.1 or CCV1.1 and higher have an improved design. Modules with suffix code V1.2 or CCV1.2 or higher have an improved ethernet request handle.

USI-0002

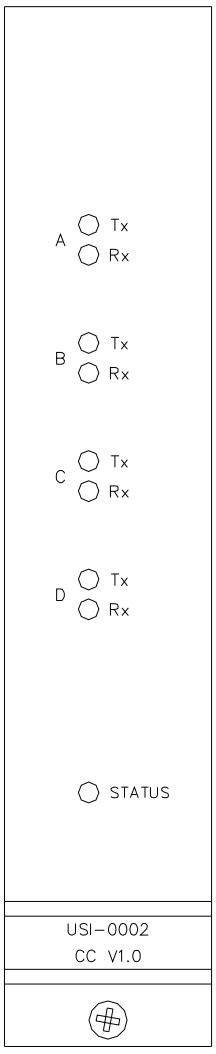
Universal Safety Interface

Description

The USI-0002 communication module handles Ethernet and Serial communication with external devices, e.g. Experion™ PKS and Safety Builder. It is located in the Controller chassis (see section “CPCHAS-0001” on page 87 or “CPCHAS-0002” on page 116).

Figure 162 on page 271 shows the front view of the USI-0002 module.

Figure 162 Front view of the USI-0002 module



The main function of communication modules is handling the communication to and from external devices and other Safety Managers. The USI-0002 has four (4) independent communication channels. See Table 45 on page 272 for the relevant details.

Table 45 The communication channels of the USI-0002 module

Channel	Description	Connector	Connects to	Communication cable
A	10/100 Mb Ethernet[1] Communication Channels	RJ45	UCOM-HSE	CCI-HSE-01
B				
C	General purpose Serial Communication Channels	10-pins AMP	DCOM-232/485	CCI-UNI-01
D				

1 The Ethernet interfaces are auto-ranging, they automatically select between 10 and 100 Mb.

Furthermore, the USI-0002 communication module acts as hardware firewall, protecting the safety functions within Safety Manager. It has:

- enhanced protective capablity,
- more internal memory; this makes it suitable for running multiple demanding communication protocols in parallel.

The module consists of the following items:

- A Motorola 8260 communication processor.
- EEPROM to store specific module data, such as the two MAC-addresses and the hardware revision number.
- 8 Mbyte Flash memory to store the system and application program. The flash content is copied to SRAM at startup and is executed from there. The flash content can be updated without removing the USI-0002 from the Controller chassis.
- 8 Mbyte Local SRAM (with Error Detecting and Correcting logic) for system and application program and information.
- 256 kilobyte shared RAM for data exchange between the USI-0002 and the Control Processor.
- Two dual-speed fast ethernet transceivers
- Two general purpose serial communication controller channels.

LED Indicators

Table 46 on page 273 lists LEDs that are visible at the front side of the USI-0002 module.

Table 46 LED indicators of the USI-0002 module

LED	Status	Description
Tx N[1]	Green	Data is being transmitted on channel N*.
	Off	No data is being transmitted on channel N*.
Rx N*	Green	Data is being received on channel N*.
	Off	No data is being received on channel N*.
STATUS	Green	No hardware errors are detected in the module.
	Red	One or more hardware errors are detected in the module.
	Off	Power down or booting

1 N = 1, 2, 3 or 4.

Reset mechanism

The USI-0002 module resets hardware via the following mechanisms:

- Power-up or power-dip.
- If the Quad Processor Pack (key switch) goes in ‘STOP’ mode.
- If the Quad Processor Pack generates a COMmunication RESet.

The communication *channels* are reset (go offline) if:

- the module resets, or
- the dedicated watchdog times out.

Note:

A dedicated watchdog has been added to prevent a possible communication lock-out on the communication lines, if the processor on the USI-0002 gets a fatal error (e.g. program hang-up or loss of clock).

Hot swap

The USI-0002 module has ‘hot swap’ features.

This means that the module may be placed or removed in a running system. The application program will not be interrupted by these actions.

Additional specifications

The USI-0002 module has a galvanic isolation of:

- ≥ 2.5 kVdc between the 5 Vdc and the Ethernet signal.
- ≥ 1.5 kVdc between the Ethernet signal and the casing of the USI-0002.
- ≥ 1.5 kVdc between the 5 Vdc and the casing of the USI-0002.

If a memory error in the USI-0002 module is detected, the Quad Processor Pack will get an interrupt.

The USI-0002 module has a power-up self-test (diagnostics) phase for testing of the following components:

- Processor address- and data registers
- Local RAM
- Shared RAM
- Exception Handling
- Software integrity

Power-up self-tests are required to reduce the risk of defective hardware or corrupted software being used.

Technical data

The USI-0002 has the following specifications.

General	Type numbers:	FC-USI-0002 V1.0
	Operating temperature:	–5°C — +70°C (+23°F — +158°F)
	Storage temperature:	–40°C — +85°C (–40°F — +185°F)
	Relative humidity:	10 — 95% (non condensing)
	Approvals:	CE; TUV, UL, CSA, FM pending
Power	5 V supply voltage:	5 Vdc ±5%
	5 V supply current:	max 1.2A
Physical	Dimensions:	176 × 35.2 × 212 mm (H × W × D) 6.93 × 1.4 × 8.35 in (H × W × D)
	Weight:	0.7 kg

BLIND-COM

Dummy communication module

Description

The dummy communication module (BLIND-COM) is placed in COM slots of the Controller chassis that are not used for actual communication modules (module USI-0001 or USI-0002).

The purpose of this module is to create a closed and grounded EMC-shield at the front of the Controller chassis.

Figure 163 on page 275 shows the front view of the BLIND-COM.

Figure 163 Front view of the BLIND-COM