7.3 USI-0002

7.3.1 Universal Safety Interface

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 or CPCHAS-0002 or CPCHAS-0003).

The below figure shows the front view of the USI-0002 module.

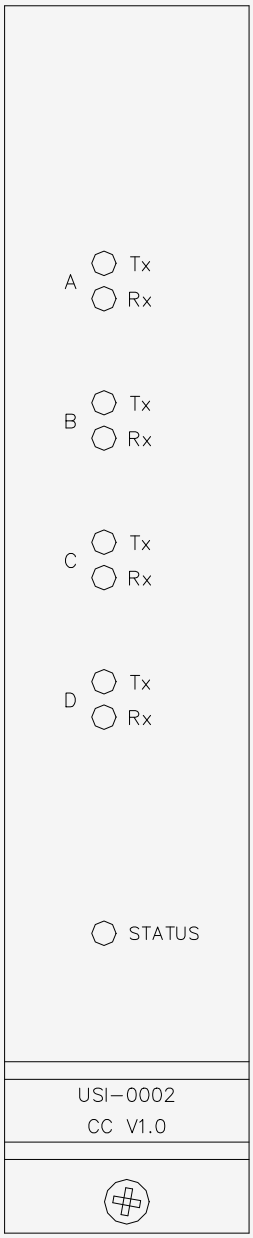


Figure 7-7: Front view of the USI-0002 module

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 the below table for the relevant details.

Table 1. The communication channels of the USI-0002 module

Channel	Description	Connector	Connects to	Communication cable
A	10/100 Mb Ethernet[1] Communication Channels	RJ45	SDW-550-EC	CCI-HSE-01, CCI-HSE-02
B				
C	General purpose Serial Communication Channels	10-pins AMP	DCOM-232/485 DCOM-485[2]	CCI-UNI-02 CCI-UNI-04
D				

1. The Ethernet interfaces are auto-ranging, they automatically select between 10 and 100 Mb. It is highly recommended to configure the port to fixed 100MB/Full duplex.
2. Required for FSC-SM SafeNet with baud rate of 1M/2M Manchester coded.

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

- enhanced protective capability,
- high internal memory for running multiple demanding communication protocols in parallel.

The module consists of the following items:

- A Motorola 8270 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.

7.3.2 LED Indicators

The below table lists LEDs that are visible at the front side of the USI-0002 module.

LED indicators of the USI-0002 module

LED	Status	Description
Tx N[1]	Green	Data is being transmitted on channel N[1].
	Off	No data is being transmitted on channel N[1].
Rx N[1]	Green	Data is being received on channel N[1].
	Off	No data is being received on channel N[1].
STATUS[2]	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.
2. When the QPP Key switch is in the stop position, the FX-USI-0002 status LED is off. In this same situation, the status LED of other USI types is Green.

7.3.3 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).

7.3.4 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.

7.3.5 Additional specifications

The USI-0002 module has a galvanic isolation of:

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

7.3.6 Technical data

The USI-0002 has the following specifications.

General	Type number[1, 2]:	FX-USI-0002
	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 V DC ± 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

Note:

1. FE-USI-0002 and FX-USI-0002 support the EUCN protocol.
2. FX-USI-0002 can replace FC-USI-0001, FC-USI-0002, and FE-USI-0002 from Safety Manager R140 and higher.