**An introduction to CC-Link Safety**

CC-Link Safety is a network with high reliability in data transmission suitable for use in safety applications that require compliance with IEC61508 SIL3 and EN954-1/ISO13849-1 Category 4. CC-Link Safety is compatible with standard CC-Link. It allows the use of existing investments in network cable, other compatible products, and existing engineering effort. Safety devices and non-safety devices can reside on the same network. CC-Link Safety will detect communication failures such as unexpected delay of communication or erroneous data that may cause malfunction of the emergency stop operation. This fail-safe function will bring machinery into a safe condition quickly if a communication failure is detected. Safety master station maintains error and failure histories of the safety remote stations.

IEC61508 SIL3 requires less than 10^{-7} of undetected communication failure rate. CC-Link Safety meets that requirement and will detect communication failures that may cause malfunction of the emergency stop operation. This fail-safe function will bring machinery into a safe condition quickly if a communication failure is detected. This is accomplished by adding a safety function layer on the upper level layer of CC-Link protocol that detects each transmission error. Information for the safety function layer includes a "running number" to specify message order and CRC32 to detect a safety data error.
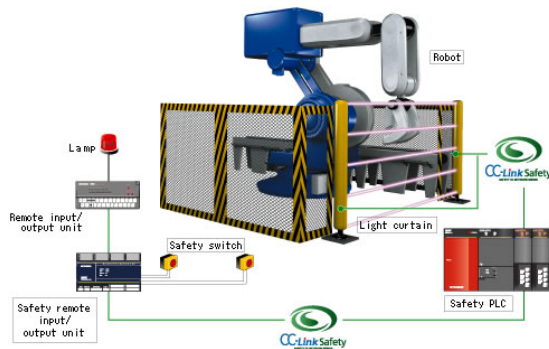
The Integrated CC-Link System

CC-Link Safety is compatible with standard CC-Link and this allows the use of existing investment in network cable, other compatible products, and existing engineering effort. Safety devices and non-safety devices can reside on the same network. It also provides the same high-speed communication and high-speed response for safety communication as standard CC-Link communication. A CC-Link Safety system consists of:

- o   a CC-Link Safety master station
- o   one or more CC-Link Safety slave stations
- o   optionally, one or more standard CC-Link slave stations (remote I/O stations or remote device stations)

Other features include:

- o   Safety communication speeds of 10Mbps.
- o   The same high-speed 10Mbps. communication speed CC-Link, enabling a safety system that provides high performance.
- o   Our safety communication design can detect every communication error or malfunction such as an unexpected delay of communication or erroneous data and then bring the system to fail safe shutdown.

o Existing CC-Link certified cables can be use for CC-Link Safety. In addition, original CC-Link compatible devices can reside on the same network that incorporates CC-Link Safety devices.
o Maintain error and failure information on the network centrally. Safety master station maintains error and failure histories of the safety remote stations, which enhances in troubleshooting.

CC-Link-Safety Specification

	CC-Link Safety – V1.12	
	Safety stations	**Standard remote I/O or remote device stations**
Number of Stations	42 Safety Stations (max)*	64 Slave Stations (max)*
Communication Speed	156k, 625k, 2.5M, 5M, 10M bps	
Error control	CRC, RAS, CRC32	CRC, RAS
Maximum Input Points	2,048 bits	2,048 bits
Maximum Output Points	2,048 bits	2,048 bits
Maximum Input Words	128 words (16-bit)	256 words (16-bit)
Maximum Output Words	128 words (16-bit)	256 words (16-bit)
Device Capacity	1 or 2 occupied stations	1,2,3 or 4 occupied stations1 or 2 occupied stations
One (1) Occupied Station Maximum amount of link data	32 Bits In 32 Bits Out No Words Available	32 Bits In 32 Bits Out 4 Words In 4 Words Out
Two (2) Occupied Stations Maximum amount of link data	32 Bits In 32 Bits Out 4 Words In 4 Words Out	64 Bits In 64 Bits Out 8 Words In 8 Words Out

* Dependant on I/O configuration