2020.Nov.

English version

CLPA Guide Book

Overview of the CC-Link Partner Association (CLPA)

CC-Link IE TSN
Open the Future of Connected Industries

20th Anniversary CLPA

The CC-Link Partner Association (CLPA) is a world leader in developing a truly open industrial network that accelerates the construction of smart factories.

CC-Link Family- the first field network from Japan and Asia.
CLPA has acquired ISO and IEC international standards for its open network family and grown into a global standard in manufacturing.
In order to accelerate the construction of smart factories utilizing IIoT, CLPA has launched the world's first open industrial network "CC-Link IE TSN" using TSN (Time-Sensitive Networking), an expansion of standard Ethernet.
In response to the growing market demand for a wide range of devices in manufacturing sites, high-performance drive equipment, and protocol implementations for various types of equipment and applications, CLPA will provide a variety of development methods and develop truly open industrial networks on a global scale.

CC-Link IE TSN
Open the Future of Connected Industries

Message

Information and communication technology has fundamentally changed our daily lives and industrial activities. Various activities, which used to be performed by human-to-human communication or document sharing, are now performed by digitalized methods and in an automated/autonomous manner. The production process now integrates many different lifecycle tasks. These include direct physical production activities, business processes, supply chains, after sales service and take back/recycling. Key to this integration is information and communication technologies. By flexibly combining complementary activity in related enterprises, new industrial sectors are emerging. With key words such as “Smart manufacturing” or “Cyber-physical production systems”, many projects from new industrial revolutions are being promoted in industrially advanced countries. Developing countries are also rapidly catching up on such trends.

Supreme Advisor
Fumihiko Kimura
Faculty of Science and Engineering,
Department of Mechanical Engineering
Professor emeritus of Tokyo University,
Doctor of Engineering

One of the important factors for the drastic changes in production is the spread of information and communication infrastructure. This consists of industrial information networks connected to enterprise information networks. Hence the integration and utilization of comprehensive data about production assets is made possible. These assets may include equipment, materials, parts, products, manufacturing technology and environment. Such industrial information networks of production assets become indispensable infrastructure for advanced manufacturing.

To realize such an industrial information network in practical and meaningful scale and cost, it must be an open and standardized network which can be shared and utilized across the boundary of individual enterprises. Versatile functional requirements with respect to communication speed, data volume, network control methods and network complexity, etc. are also desirable. Finally, continuing development works should be performed to seek higher functionalities.

The CLPA has addressed these requirements for an open and standardized industrial network. This was begun with the CC-Link open fieldbus. Ethernet-based CC-Link IE followed, and high-performance CC-Link IE TSN was recently introduced. The CLPA will continue to respond to the ever expanding demands for advanced industrial networks. In this way, the CC-Link Family of open networks will contribute to the development of future advanced manufacturing systems.

CLPA, the organization promoting open networks as well as your business partner.

Support vendors and users in the global promotional activities of the CC-Link Family.

Under the motto “CC-Link, the open field network, will become world’s de facto standard”, CLPA was established in November 2000. Ever since, the Board of Directors, Marketing Task Force and Technical Task Force have joined forces to help vendors to develop compatible products and users to build open FA systems.

◎The Board of Directors consisting of ten firms operates the CLPA and decides on major association issues.

◎Increase partner membership and adoption of the CC-Link Family.

Marketing Task Force

Oversees a wide variety of promotional activities world wide, including fairs, conferences, seminars, advertising programs, social media and other activities.

◎Focuses on management of related technology and coordinates provision of information to members and outside standard-setting organizations.

Technical Task Force

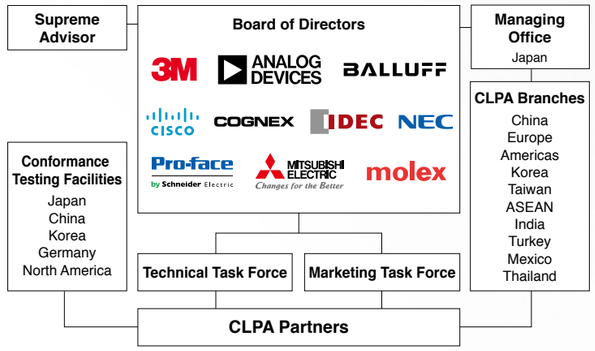
Develops new specifications for the CC-Link Family, including "CC-Link IE TSN", the first open industrial Ethernet to support TSN technology. Also develops technical materials such as installation manuals as well as conformance test specifications and addresses various technical issues.

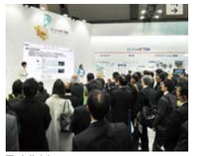
Get the membership of CLPA. The partners can develop business opportunities by receiving services such as support for developing compatible products.

The member firms are entitled to obtain the most up-to-date technical information and CC-Link Family specifications for free. In addition, support for conformance tests that are essential to establishing reliability is available at various stages of developing compatible products.

- Free distribution of CC-Link Family specifications
- Conducting conformance tests
- Technical support

■ **Organization Chart for the CC-Link Partner Association**

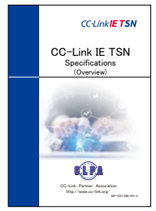




Exhibitions

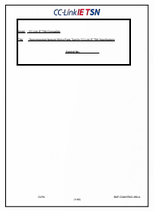
Seminars

Distributing information



CC-Link IE TSN
Specifications

CC-Link Cable
Installation Guide



Conformance test
specifications

■ **CLPA membership categories (price excluding tax)**

			Registered member	Regular member	Executive member	Board member
Annual fees (...) shows monthly fees for intermediate enrollment			—	JPY 100,000 (JPY 9,000)	JPY 200,000 (JPY 18,000)	JPY 1,000,000 (JPY 84,000)
Initiation fee			—	—	—	JPY 1,000,000
Acquisition of product specifications			Provided for free upon membership registration			
License to use CC-Link Family technology	SLMP*1		Included			
	CC-Link Family Specifications (Other than SLMP)		—	Included		
Conformance Test Fees (per product)	CC-Link	- Remote Device Station - Remote I/O Station - Cable	N/A	200,000 JPY	100,000 JPY	Not charged (included in annual fees)
		- Master/Local Station - Intelligent Device Station	N/A	300,000 JPY	200,000 JPY	
	CC-Link/LT	- Master Station - Remote I/O Station - Cable	N/A	200,000 JPY	100,000 JPY	
	CC-Link IE Control Network	- Normal Station - Control Station	N/A	300,000 JPY	200,000 JPY	
	CC-Link IE Field Network	- Master/Local Station - Intelligent Device Station	N/A	300,000 JPY	200,000 JPY	
	CC-Link IE Field Network Basic	- Master/Slave Station	N/A	Not Charged (free)	Not Charged (free)	
	CC-Link IE Safety	- IESMAP (Master) - IESSLP (Slave)	N/A	300,000 JPY	200,000 JPY	
	CC-Link IE TSN	- Master/Local Station - Remote Station	N/A	100,000 JPY	50,000 JPY	
Recommended-wiring Product Test Fees (per product)	CC-Link IE Control Network	- Recommended Network Wiring Components	N/A	100,000 JPY	50,000 JPY	
	CC-Link IE Field Network	- Recommended Network Wiring Components	N/A	100,000 JPY	50,000 JPY	
Use of CC-Link Family logo			—	Included		
Technical support			—	Included		
Publishing products in home page·Electronic Partner Product Catalog (No charge)			—	Included		
Promotion at fairs			—	Included		
Information about events Posting of company name on CLPA web site			Included			

*1 SLMP: Seamless Message Protocol
*2 Download the test tools and conduct a self-test.
*3 If you submit the result of a test conducted on behalf of the CC-Link Partner Association at a testing organization recognized by the CC-Link Partner Association, the cost will be as follows.
· Regular : 50,000 JPY · Executive: 20,000 JPY

Leveraging the forces of partner firms around the world, the CC-Link Family will take another giant step forward.

CC-Link Family…making the next leap foward with CLPA Partners!

Board of Directors

3M Company
3M Korea Ltd.
A&D Co., Ltd.
ABB AS, ROBOTICS
ABB K.K.
AC&T system CO.,LTD
Adullam Tech.
Advanet Inc.
Advantech Japan Co., Ltd.
AGC Inc.
Ailes Electronic Industry CO., LTD
Allied Automation,Inc.
Allied Telesis K.K.
ALPHA SYSTEMS CO.,LTD
Altima Corp.
Analog Devices
ANYWIRE CORPORATION
Aparian, Inc.
Asahi Enterprise Corporation
ASKA CORPORATION
ATEQ K.K.
Atlas Copco Industrial Technique AB
Azbil Corporation
B&PLUS KK
Balluff GmbH
Beckhoff Automation GmbH
Beijing D&S FieldBus Technology Co., Ltd.
Belden Electronics Division
Belden Hirschmann Industries（Suzhou）Ltd.
Belden India Pvt. Ltd.
Berk-Tek LLC
Bihl+Wiedemann GmbH
Binder USA, LP
Blum-Novotest GmbH
BROTHER INDUSTRIES LTD
Buerkert Werke GmbH & Co. KG
C.D.N CORPORATION
CANON ANELVA CORPORATION
CHINO CORPORATION
Chiyoda Co., Ltd
CHUO SEISAKUSHO, LTD.
Cisco Systems
CITIZEN FINE DEVICE CO., LTD.
CKD Corporation
CKD NIKKI DENSO CO., LTD.
Cobtel Precision Electronics Co., Ltd.
Cognex Corporation
Conductix Wampfler
CONTEC CO.,LTD
Corning International K.K.
CORRENS CORPORATION
COWIN.FA Co.,Ltd
CREVIS CO., LTD
DAI-ICHI DENTSU, LTD.
DAIICHI ELECTRONICS CO., LTD
DAINCUBE Corp.
Datalogic Automation s.r.l.
DENSO WAVE INCORPORATED
Diatrend Corporation
Dyadic Systems Co.,Ltd.
DYDEN CORPORATION
EAST WEST ELECTRIC WIRE CO.,LTD.
ELCO（TIANJIN）ELECTRONICS CO., LTD.
Emerson Industrial Automation - ASCO
ENDO KOGYO Co.,Ltd.
ESPEC TEST SYSTEM CORP.
ESTIC CORPORATION
FAG Industrial Service GmbH
FANUC LTD
FASTECH Co., Ltd.
Festo AG & Co. KG
Fluidyne Control Systems（P）Ltd.
Fortinet Japan K.K.
Fortive ICG Japan Co., Ltd.
FUJI CONTROLS COMPANY LIMITED
FUJI ELECTRIC CABLE CO.,LTD.
Fuji Electric Co., Ltd
Fuji Electric F-Tech Co., Ltd.
Fujikin Incorporated
Fukushima SiC Applied Engineering Inc.
GIKEN INDUSTRIAL CO., LTD.
HAKARU PLUS CORPORATION
Hakko Electronics Co., Ltd
Hangzhou Hikrobot Technology Co.,Ltd.
Hans Turck GmbH & Co. KG
Harmonic Drive Systems, Inc
HARTING JAPAN
Helmut Fischer GmbH Institut fuer Elektronik und Messtechnik
HELUKABEL GmbH
HERUTU ELECTRONICS CORPORATION
HIGEN MOTOR CO., LTD
Hilscher Gesellschaft für Systemautomation mbH
Hirata Corporation
Hirose Electric Co., Ltd.
Hirschmann Automation and Control KK.
Hitachi Industrial Equipment Systems Co., Ltd.
Hitachi Metals, Ltd.
Hivertec,inc.
HMS INDUSTIRAL NETWORKS
HMS Industrial Networks AB
HOKUYO AUTOMATIC CO., LTD.
Hongke Technology Co.,Ltd.
HORIBA STEC Co., Ltd.
Human Automation
Hyulim ROBOT Co.,Ltd.
HYUNDAI HEAVY INDUSTRIES CO., LTD
IAI Corporation
IAR Systems AB
IDEC Corporation
igus k.k.
IHI Corporation
Industrial Control Communications, Inc
Industrial Software Co.
Inexbot Nanjing Technology Co., Ltd.
International Laboratory Corporation
ITOH DENKI CO., LTD.
JANOME SEWING MACHINE CO., LTD.
Japan Quality Assurance Organization（JQA）
Japan Telegartner Ltd.
JCC Co., Ltd.
JEL SYSTEM CO., LTD
JFE Plant Engineering Co., Ltd.
JISANG ELECTRIC CO., LTD.
JMACS Japan Co., Ltd.
JTEKT CORPORATION
JVCKENWOOD Public & Industrial Systems Corporation
K.C.C. SHOKAI LIMITED
Kawasaki Heavy Industries, LTD.
KEYENCE Corporation
Kistler Lorch GmbH
KITAZAWA ELECTRIC WORKS CO., LTD.
KK TFF Fluke Networks
KOGANEI CORPORATION
KOYOELECTRONICS INDUSTRIES CO.,LTD.
Kubota Corporation
Kunshan SVL Electric Co.,Ltd
KURAMO ELECTRIC CO., LTD
KURODA Pneumatics Ltd.
KWANG-IL ELECTRIC WIRE CO., LTD.
KYOEI ELECTRIC CO.,LTD
KYOWA ELECTRONIC INSTRUMENTS CO., LTD.
L Light
LAUMAS ELETTRONICA SRL
Leoni Special Cables GmbH Business Unit Automation & Drives
LEONI Special Cables（China）Co.,Ltd.
Lika Electronic Srl
Long Yang Enterprise Co., Ltd.
LS Cable&system Ltd.
Lutze Inc.
M-System Co., Ltd.
Magnescale Co., Ltd.
MARS TOHKEN SOLUTION CO. LTD.
Matrox Electronic Systems Ltd.
Matsusada Precision Inc.
MEIDENSHA CORPORATION
MEIRYO TECHNICA CORPORATION
MELEC Inc.
METIS CO., LTD.
METTLER TOLEDO
METTLER TOLEDO AG
MICRO-LOG SYSTEMS
MicroTechnica Co., Ltd.
Minebea Intec GmbH
Minebea Mitsumi Inc.
MISUMI CORPORATION
Misumi Corporation
Mitsubishi Electric Turkey Elektrik Urunleri A.S.
MITSUBISHI ELECTRIC CORPORATION
MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED
Mitsubishi Electric FA Industrial Products Corporation
Mitsubishi Electric India, PVT LTD
Mitsubishi Electric Information Network Corporation
MITSUBISHI ELECTRIC MECHATRONICS SOFTWARE CORPORATION
MITSUBISHI ELECTRIC MICRO-COMPUTER APPLICATION SOFTWARE COMPANY LIMITED
MITSUBISHI ELECTRIC SYSTEM & SERVICE CO., LTD.
Mitsubishi Electric TOKKI Systems Corporation
Molex, LLC
MOXA Inc.
MTT Corporation
MYUNGBO CABLE CO.,LTD.
Nabeya Bi-tech Kaisha
NACHI-FUJIKOSHI CORP.
NADA ELECTRONICS, LTD
NADEX Co., Ltd.
Nanjing DECOWELL Automation CO. Ltd.
Nanjing Solidot Electronic Technology Co., Ltd.
NEC Corporation
Net One Systems Co., Ltd.
NICHIDEN SHOKO CO.,LTD.
Nichigoh communication electric wire co., Ltd.
NINGBO RONGHE WIRE & CABLE CO.,LTD.
Nippon Dempa Co., Ltd
NIPPON DENKI KENKYUSHO CO., LTD.
Nippon Seisen Cable, Ltd.
NISSEI ELECTRIC CO.,LTD.
NITTA CORPORATION
NKE CORPORATION
Northwire,Inc.
Nozomi Networks
NSD Corporation
NSK Ltd.
NTI AG
NTT Communications Corporation
NUSCO CO.,LTD.
O-DEAR INTERNATIONAL CORPORATION
OFS Fitel LLC
OKANO CABLE Co.,Ltd.
Oki Electric Cable Co., Ltd.
OMRON Corporation
ONTEC CO.,LTD.
OPTEX FA CO.,LTD.
orientalmotor
ORION ELECTRONICS
Palo Alto Networks k.k
panasonic Industrial Device SUNX Co
Panduit, Corp.
Parker Hannifin
Pepperl + Fuchs GmbH
PEPPERL+FUCHS K.K.
Phoenix Contact GmbH & Co. KG
Phoenix Contact K.K
Pilz GmbH &Co
Pneumax S.P.A.
PROFICIENT（SHANGHAI）INTERNATIONAL CO.,LTD
Red Lion Controls
REJ Co., Ltd
Renesas Electronics Corporation
RKC INSTRUMENT INC.
Robostar Co., Ltd
ROBOTEC Inc.
SANSHA ELECTRIC MFG. CO.,LTD.
SANTEST CO., LTD
Sanyo Machine Works. Ltd.
Sasaki Sekkei Co., Ltd.
Schneider Electric Japan Holdings Ltd.
Seidensha Electronics co., ltd.
SEIKO EPSON CORPORATION
Sekisui Jushi Cap-Ai System Co.,Ltd.
Servoland Corporation
Shanghai Ashiya Trading LTD.
Shanghai Automation Instrumentation Co., Ltd
Shanghai Golytec Automation CO.,LTD.
Shanghai Hurry Elec. Tech. Co., Ltd
Shanghai Powerful Automation Technology Development Co., Ltd
Shanghai SUNCHU Electromechanical Device Co., Ltd.
Shanghai Suntone Electronic Co., Ltd.
Sharp Corporation
Shenzhen Donglaier Intelligent Technology Co.,Ltd
Shenzhen Inovance Technology Co., Ltd.
Shenzhen Siron Electrial Co.,LTD
SHIBAURA MACHINE CO., LTD.
SHIMADEN CO., LTD.
Shimafuji Electric Incorporated
SHINKO TECHNOS CO.,LTD
SHOEI Electric Co., Ltd.
Sichuan Odot Automation System Co., Ltd.
SICK AG
SILA Embedded Solutions Gmbh
SINKA JAPAN CO.,LTD.
SINSEONG IDOL
SMC CORPORATION
Soft Servo Systems, Inc.
Solartron Metrology Ltd
Spinner GmbH
SR Technology CO.,Ltd.
STEP（Shanghai）Industrial Corporation Ltd.
STMicroelectronics K.K.
Sumitomo Heavy Industries,Ltd.
Surpass Industry Co., Ltd.
SWCC SHOWA CABLE SYSTEMS CO., LTD.
TAIHAN ELECTRIC WIRE CO., LTD.
TAIYO CABLE（DONGGUAN）CO., LTD.
TAIYO CABLETEC CORPORATION
TAIYO ELECTRIC CO.,LTD.
TAIYO,LTD.
TAKEBISHI CORPORATION
Takikawa Engineering Co., Ltd.
TAMADIC Co., Ltd.
TAMAGAWA SEIKI CO., LTD.
TEAC Corporation
Technical & Try CO., LTD
TECHNO Co., Ltd.
Teledyne DALSA
TESSERA TECHNOLOGY INC.
Texas Instruments, Inc.
THK CO.,LTD.
Thomas Cable Co., Ltd.
Thomas engineering co.,LTD
Tianjin Geneuo Technology Co., Ltd.
Tianjin Sentinel Electronics Co., Ltd.
TOGAMI ELECTRIC MFG. CO., LTD
Toho Technology Corporation
Toshiba Schneider Inverter Corporation
TOYO ELECTRIC CORPORATION
TOYO ELECTRIC MFG. CO.,LTD.
TOYOGIKEN CO., LTD.
TPC Mechatronics Corp.
Trend Micro Incorporated
Trend Micro Incorporated.
Tyco Electronics Japan G.K.
U.I. Lapp GmbH
UNION DENSHI WORKS CO., LTD.
Unipulse Corporation
UNITEC Corp.
UNITED ELECTRIC WIRE（KUNSHAN）CO., LTD.
Valcom Co.,LTD.
VAT Vakuumventile AG
Wago Company of Japan, Ltd.
Weidmueller Interface GmbH & Co. KG
WITTENSTEIN ternary Co.,Ltd.
WUXI LINGKE AUTOMATION TECHNOLOGY CORPORATIONS
Yamaha Corporation
YAMAHA MOTOR CO., LTD.
YAMATO SCALE CO., LTD.
YANTAI DERON INDUSTRY CO.,LTD
YASKAWA ELECTRIC CORPORATION
Yokogawa Electric Corporation
YOSHINOGAWA ELECTRICWIRE&CABLE
YOSIO ELECTRONIC COMPANY
Zhejiang Hechuan Technology Co.,Ltd
Zhejiang Wanma Group Special Electronic Cable Co., Ltd.
Zhejiang Zhaolong Interconnect Technology Co., Ltd.
ZUKEN ELMIC,INC.

Alphabetical listing by company name for Regular Members and above (as of October 2020)

The CLPA's commitment to advancing the CC-Link Family betters manufacturing sites around the world.

These figures are self-explanatory about the development and growth on the global level.

Many member firms come crossing the borders to join the CC-Link Partner Association.

Though starting with only 134 member firms when CLPA was established, it is expected to reach more than 3793 member firms in financial year 2019 (as of the end of March 2019). The overseas firms account for as much as 80 % of the memberships, providing solid evidence that the world has recognized that the CC-Link Family have become true global standards.

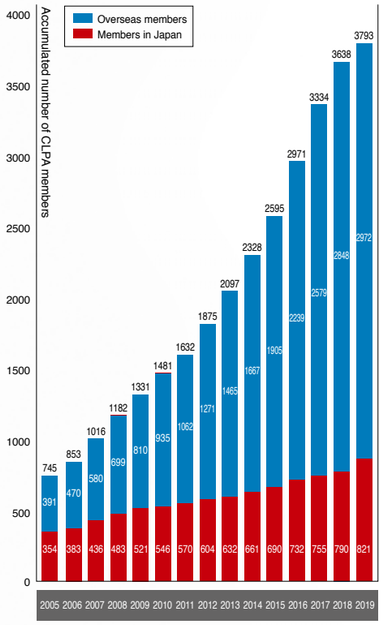
A line of diversified CC-Link Family compatible products, as many as the number of user voices.

With the increasing number of vendor firms joining the CC-Link Partner Association, the accumulated number of CC-Link Family compatible products is now over 2000 models. Partner companies also receive the benefit of their products being promoted in various CC-Link Partner Association activities free of charge, including the Electronic Partner Product Catalog.

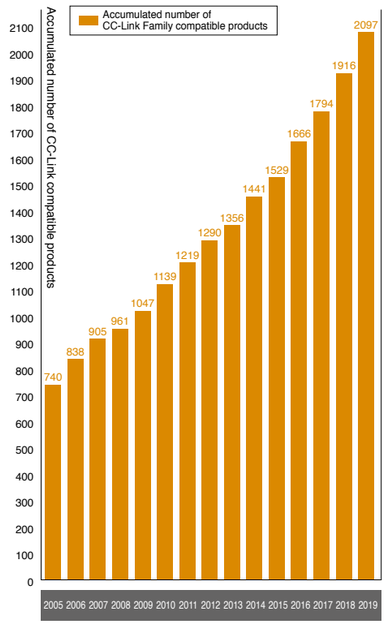
As a sign of our global acceptance, the total number of shipped devices is approx. 30 million.

The growth of the installed base is being driven by the automotive, semiconductor and LCD panel industries. We expect that this growth will continue to accelerate.

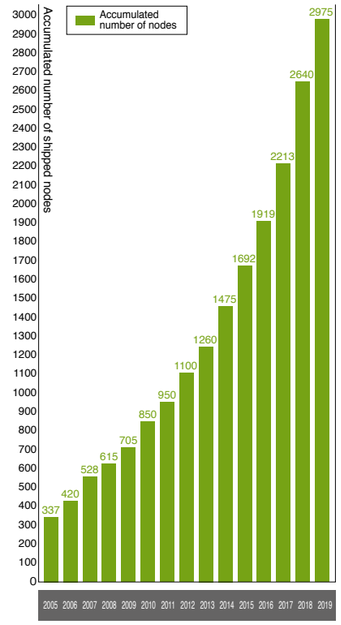
◎Growing CLPA members



◎Increase in number of CC-Link compatible products



◎Increase in number of shipped nodes （Unit:10000 nodes）



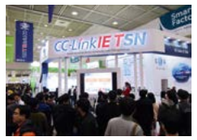
CC-Link, CC-Link Safety and CC-Link IE, ... The global acceptance of the first open industrial network from Japan continues.

As a key feature of our promotion and the best opportunities to exchange information with more vendors and users, CLPA participates in exhibitions in Japan and overseas. We will continue to actively participate in more trade shows and exhibitions of diversified industries to promote technical understanding of the future of manufacturing, CC-Link IE TSN.

In China

Smart Manufacturing Forum 2019 (Guangzhou)

In Korea

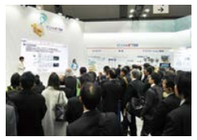


Smart Factory + Automation World 2019

In Europe and North America

SPS2019

In Japan



IIFES2019

CLPA is a global operation with local offices in 11 regions worldwide. Each office works to increase the adoption of CLPA networks by device makers, machine builders and end-users operating in these regions.

CLPA's 11 global offices are located in Japan, China, Europe, North America, Korea, Taiwan, ASEAN, India, Turkey, Mexico and Thailand. These offices promote CC-Link Family technology and provide a wide range of services for CLPA members.

❶Headquarters (Japan)
6F Ozone-front Building, 3-15-58, Ozone, Kita-ku, Nagoya 462-0825, Japan
TEL : +81-52-919-1588 FAX : +81-52-916-8655
E-mail : info@cc-link.org
URL : https://www.cc-link.org/

❷China
Headquarters（Tongji University）:School of Electronics and Information Engineering,Jiading Campus, Tongji University, Shanghai, P.R.ChinaHead Office : 19F No.1386 Hong Qiao Road, Shanghai, P.R.China
TEL : +86-21-64940523 FAX : +86-21-64940525
E-mail : support@cn.cc-link.org
URL : https://www.cc-linkchina.org.cn/

❸Europe
Postfach 10 12 17, 40832 Ratingen, Germany
TEL : +49-2102-486-7988 FAX : +49-2102-532-9740
E-mail : partners@eu.cc-link.org
URL : https://eu.cc-link.org/en/

❹North America
500 Corporate Woods Parkway,Vernon Hills, IL60061, USA
TEL : +1-847-478-2647 FAX : +1-847-876-6611
E-mail : info@cclinkamerica.org
URL : http://am.cc-link.org/en/

❺Korea
RM. 711, 7F GANGSEO HANGANG XI-TOWER A, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea
TEL : +82-2-3663-6178 FAX : +82-2-6224-0158
E-mail : clpakor@meak.co.kr
URL : http://kr.cc-link.org/ko/

❻Taiwan
No.105, Wugong 3rd Rd., Wugu Dist., New Taipei City 24889, Taiwan(R.O.C.)
TEL : +886-2-8990-1573 FAX : +886-2-8990-1572
E-mail : cclink01@ms63.hinet.net
URL : https://tw.cc-link.org/zh/

❼ASEAN
307 Alexandra Road #05-01/02Mitsubishi Electric Building Singapore 159943
TEL : +656-470-2480 FAX : +656-476-7439
E-mail : cclink@asia.meap.com
URL : http://as.cc-link.org/en/

❽India
Emerald House, EL-3, J Block, M.I.D.C. Bhosari, Pune - 411 026, Maharashtra, INDIA
TEL : +91-20-4624 2100 FAX : +91-20-4624 2200
E-mail : Clpa_India@asia.meap.com
URL : https://in.cc-link.org/en/

❾Turkey
Serifali Mahallesi Nutuk Sokak.No:5 34775Umraniye-istanbul /Turkey
TEL : +90-216-526-39-90 FAX : +90-216-526-39-95
E-mail : partners@tr.cc-link.org
URL : https://eu.cc-link.org/en/

❿Mexico
Mariano Escobedo 69, Zona Industrial - Tlalnepantla, 54030, Estado de Mexico, Mexico
TEL : +52-55-3067-7517
E-mail : info@cclinkamerica.org
URL : http://am.cc-link.org/sp/

⓫Thailand
CC-Link Promotion Center - Thailand
101, True Digital Park Office, 5th Floor, Sukhumvit Road, Bangchak, Phra Khanong, Bangkok 10260
TEL : +66(2) 092-8600 Ext. 5506
Fax : +66(2) 043-1231-33
E-mail : info@cclinkthailand.com
URL : http://th.cc-link.org/th/

High-level Technology and Ease-of-Use

The CC-Link Family has been certified to conform to international standards, IEC Standards and SEMI Standards for the semiconductor and FPD industries, in addition to Japanese Industrial Standards, Chinese National Standards, ISO Standards, Korean National Standards and Taiwanese Standards. An established de facto standard in Japan, now it is now also recognized as a global standard. It meets the conventional requirements for open networks, communication compatibility and a diverse lineup of compatible products. In addition, it can drastically improve the production efficiency of manufacturing systems and applications. Its high technological level and ease of use are internationally appreciated.

From a Japanese defacto standard to a Global Standard

International Standard: ISO	ISO15745-5 : CC-Link published in January 2007
International Standard: IEC	IEC61158, IEC61784-1 : CC-Link published in December 2007 IEC61158, IEC61784-2 : CC-Link IE Control, CC-Link IE Field published in August 2014 IEC61784-3-8 : CC-Link Safety published in June 2010 IEC61784-3-8 : CC-Link IE Safety published in August 2016
SEMI Standard	SEMI E54.12 : CC-Link published in July 2001 SEMI E54.23 : CC-Link IE Field published in May 2013 SEMI E54.23 : CC-Link IE TSN published in May 2020
The National Standards of the People's Republic of China: GB	GB/Z 19760-2005 : CC-Link published in December 2005 GB/T 20299.4-6 Chinese BA (Building Automation) standard : CC-Link published in December 2006 GB/T 19760-2008 : CC-Link published in June 2009 GB/Z 29496.1.2.3-2013 : CC-Link Safety published in June 2013 GB/T 33537.1.2.3-2017 : CC-Link IE published in April 2017 GB/Z 37085-2018 : CC-Link IE Safety published in December 2018
Japanese Industrial Standards: JIS	JIS TR B0031 : CC-Link published in May 2013
Korean National Standards: KS	KSB ISO 15745-5 : CC-Link published in March 2008 KSC IEC 61158/61784 : CC-Link published in December 2011 KSC IEC 61784-5-8 : CC-Link, CC-Link IE Control, CC-Link IE Field published in December 2014 KSC IEC 61784-3-8 : CC-Link IE Safety published in July 2018
Taiwan Standards: CNS	CNS 15252X6068 : CC-Link published in May 2009

Development flow for CC-Link Family compatible products.

The CC-Link Partner Association will support you from development to sales of CC-Link Family compatible products.

CLPA

Development Support

As part of various support activities, in addition to CLPA-sponsored seminars, there are seminars hosted by our Board Members (such as Mitsubishi Electric Corporation). These are intended to provide useful information for all users of the CC-Link family, from novices to experts.

Provision of Technical Specifications

CLPA provides CC-Link Family Specifications for development methodologies free of charge.
For details, please refer to "Development Method Guide".

Provision of Conformance Test Specifications

CLPA offers member firms the “CC-Link Conformance Test” specifications for free, applicable to developed products.

Testing Laboratory

CLPA conducts conformance tests. The member firms use the conformance test facilities to test CC-Link Family compatible products in various ways. The noise test, hardware test, software test and combined test among others enable verification of correct performance.

Testing Laboratory
https://www.cc-link.org/en/support/testlab/index.html

Promotion①

"Electronic Partner Product Catalog" is available, fully covering all the CC-Link Family compatible products that the member manufacturers have developed and put on the market. CLPA provides users with diversified solutions.

Electronic Partner Product Catalog
https://www.cc-link.org/en/downloads/index.html#section-A

Promotion②

By registering compatible product information, products can be published on the CLPA website.

Partner Manufacturers

Consider Development

Select the station type, certification class, development method, etc. It is possible to use various development methods (dedicated communication LSI, embedded module, software stack, etc.) provided by the corresponding development tool partner manufacturer.

How to Become a Member

In order to develop and sell CC-Link Family compatible products, you must first become a regular, executive or board member of the CC-Link Partner Association.
Visit the CC-Link Partner Association website below to apply for membership.

CC-Link Link Partner Association
https://www.cc-link.org/en/clpa/members/index.html

Development/Evaluation

We provide detailed designs of hardware and software for products to be developed. Download the conformance test specifications, system profile (CSP+) specifications, CSP+ creation guidelines, and CSP+ support tools from the CLPA website.

For downloads
https://www.cc-link.org/en/downloads/index.html

Mass Production Planning·Evaluation

Make a prototype based on the design and perform various evaluations.

Do Conformance Tests

Perform conformance tests for each model based on the "Conformance Test Specification". To facilitate the conformance testing process, the CC-Link Partner Association has test centers available in Japan and overseas.

※A certificate will be issued after a conformance test is passed.

Sales

Products that have passed the conformance test can be sold as compatible products.
In order to promote products on the CLPA website, the product information must be added by the partner manufacturer.

Development Tool Manufacturer

Inquiries/Consulting

In addition to consultation on product development, seminars sponsored by development tool partner manufacturers are also held.
Please contact the manufacturer.

Development Tool Sales

Please contact the manufacturer.

Technical Support

Support for technical questions in the process of development.
Please contact the manufacturers.

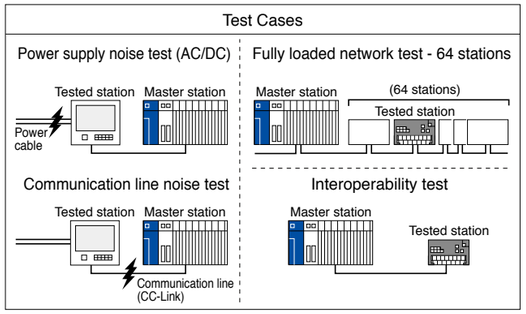
What is a Conformance Test?

- A conformance test is to be conducted on each model to ensure reliable communication between CC-Link Family compatible products.
- Your products need to be tested to ensure that your products meet the CC-Link Family communication specifications and can be connected to CC-Link networks.
- We offer test tools for CC-Link IE Field Basic, SLMP and open tools for CC-Link IE TSN.

By conducting the conformance test, you can ···

- ensure the communication reliability of your product with the CC-Link Family, and
- easily design system configurations where products of different manufacturers and models are connected.

Test Cases



* The conformance test is to ensure that the product meets the common specification of CC-Link Family. The conformance test is not intended to ensure the performance and quality of the product itself.

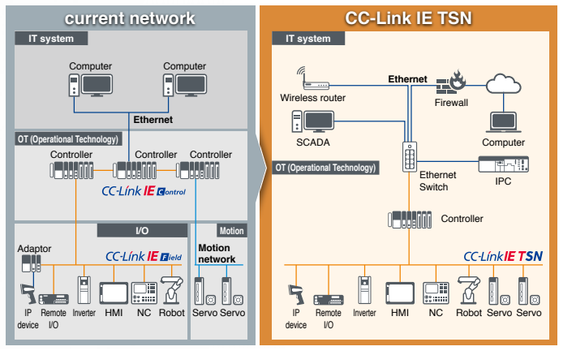
CC-Link IE TSN

CC-Link IE TSN | Adopts TSN technology, significantly increasing the performance and functions of CC-Link IE

By adopting TSN (Time-Sensitive Networking), which achieves real time communication by time sharing, different networks can coexist on a single cable. Also, this efficient protocol will achieve high speed, accurate control.

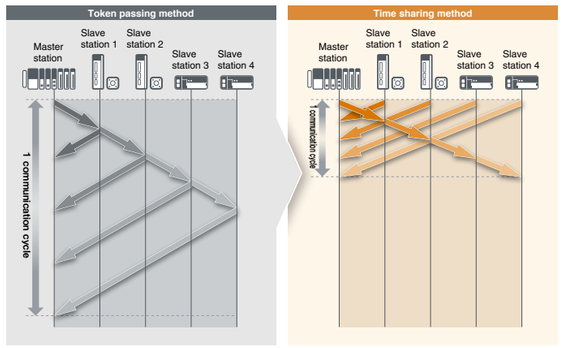
Integration of networks

◎Integrate multiple OT and IT networks. Increase system structure flexibility and reduce wiring cost.



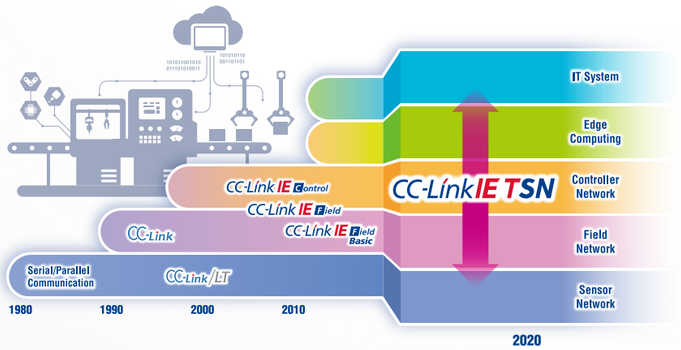
Dramatic reduction of communication cycles

◎Shorten cyclic data update time with time sharing. This simultaneously transmits and receives input and output communication frames in both directions by using network time synchronization.



Roadmap

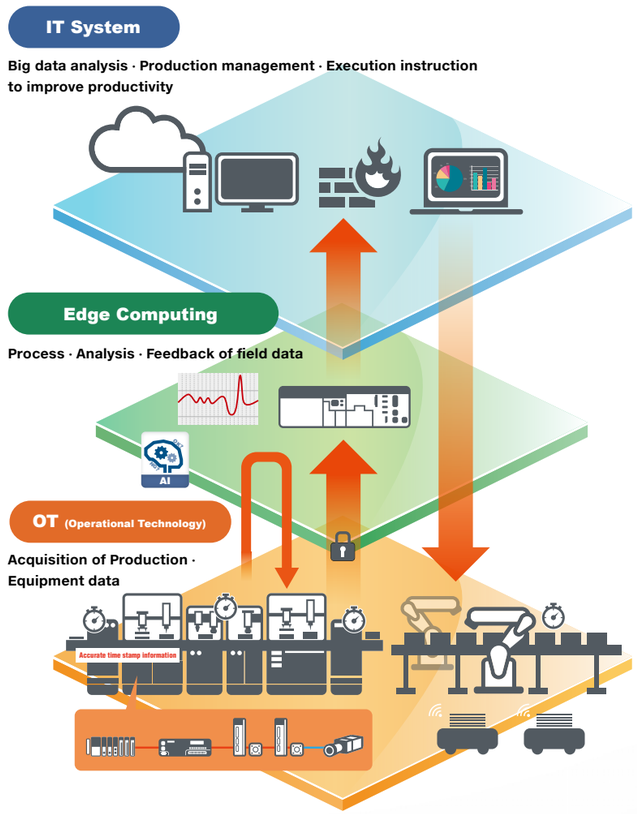
◎"CC-Link"- the open fieldbus originally developed by global automation leader Mitsubishi Electric.
"CC-Link IE"- the first gigabit Ethernet based industrial open network, enabling seamless data transmission from IT to OT.
"CC-Link IE TSN"- the first to combine open gigabit Ethernet bandwidth with Time-Sensitive Networking (TSN).
For more than 20 years since the CLPA was established in 2000, the CC-Link Family has evolved into networks that seamlessly connect from the sensor level to the controller level and further to enable OT/IT convergence.



Accelerate smart factory construction with TSN technology. The first in the world applying TSN technology to open industrial Ethernet.

CC-Link IE TSN

Open the Future of Connected Industries



1 Accurate time stamp information and advanced analysis

- Collection of field data with accurate time stamp information
- Improvement of analysis accuracy by application using AI

2 Network integration

- Coexistence of multi-protocol on a single trunk
- Realize FA layer real time control and IT layer seamless communication at the same time
- Construct general communication, motion communication and safety communication on a single network

3 Realization of advanced motion control

- Fast and high accuracy synchronization control
- Optimize device performance by combining different communication cycles

4 Utilization of wireless network and 5G

Future concept

- Layout-free production line construction
- Wiring-free system construction

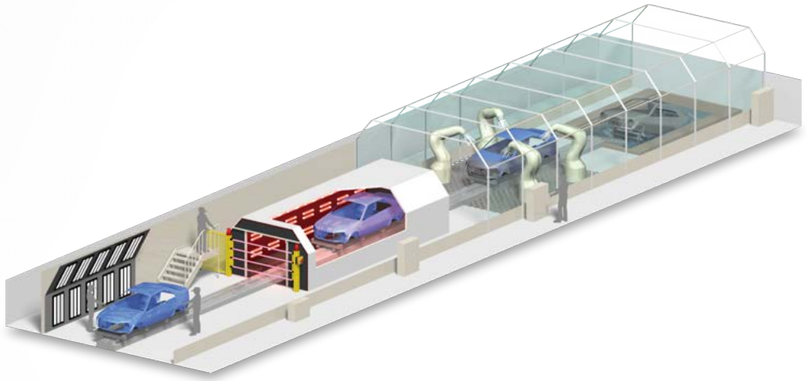
5 Compatibility of FA(OT)-IT integration and security

Future concept

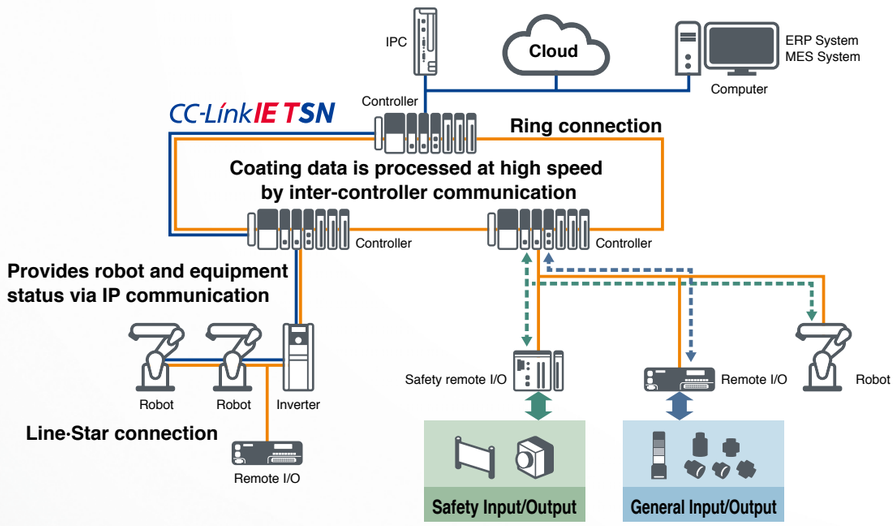
- Build a stable security environment
- Expansion of devices and services compatible with security

Use cases

CASE 1 Automotive (Paint shop)

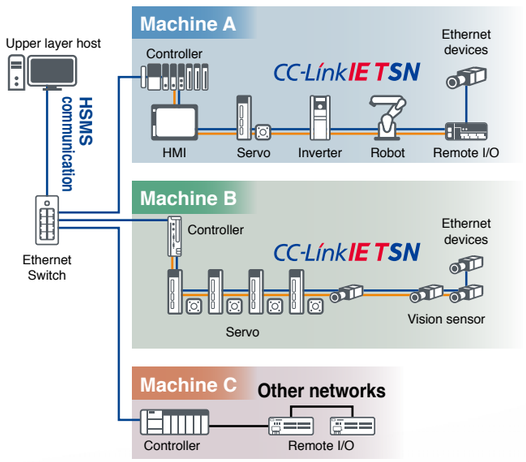


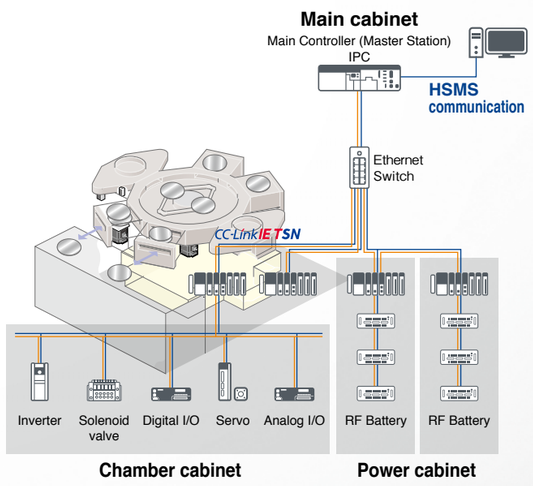
◎Communicates both safety and non-safety communication on a single network
◎Flexible cabling supports line/star/ring topology
◎Supports from controller level downwards, handling large amounts of data for plant monitoring on the same line



CASE 2 Semiconductor process tool

◎Provides rapid communications to handle large amounts of recipe and traceability data
◎Does not affect operational communication determinism while co-existing with HSMS communication
◎Ethernet devices communicate directly with the host on the upper layer
◎Use current design assets by implementing a software protocol stack on top of the main controller (Master Station) IPC



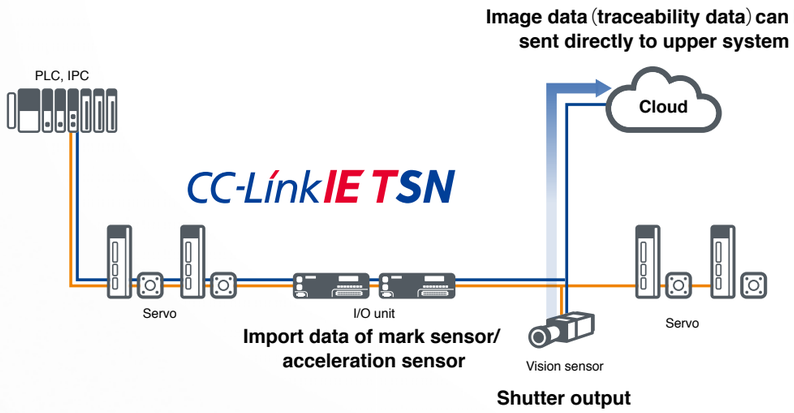


Use cases

CASE 3 Printing machine

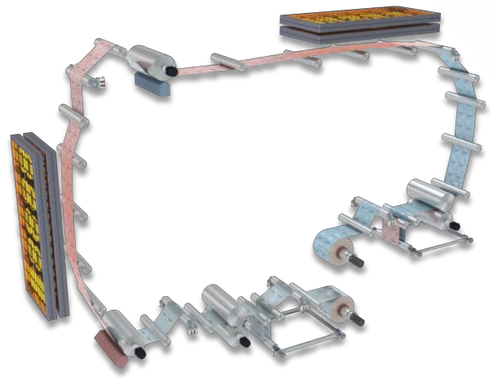
◎Vision system integration. Combine vision system IP traffic on the same network as motion control data while communicating with upper systems.

◎High speed, accurate servo system



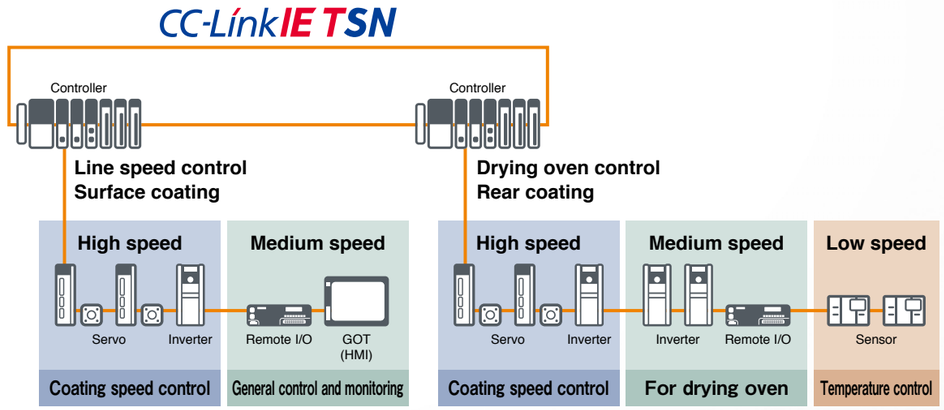
CC-Link IE TSN — Standard Ethernet

CASE 4 Lithium ion battery manufacturing machine



◎High accuracy control synchronization for multiple combined servo and inverter axes.

◎Increase machine performance by combining fast communication cycle devices (e.g. servo) with slower devices (e.g. inverter).



Cyclic communication is enabled by suppressing the effect of each slave station's performance response.

CC-Link IE TSN

Network List

CC-Link IE TSN

TSN technology makes it possible to mix different networks on the same trunk line and provide real-time communication through time synchronization. Thus the motion control capabilities have been significantly enhanced.

CC-Link IE Field Basic

CC-Link IE communication using general-purpose Ethernet technology can be easily applied to small-scale equipment not requiring high-speed control. This is easy to use and develop. Cyclic communication on the CC-Link IE Field network can be realized by software implementation alone.

CC-Link IE Control

The industrial Ethernet network that realizes high reliability by duplexing the transmission path. The core network that bundles each field or motion network and provides controller-level distributed control with gigabit speed high data capacity.
With the newly added safety communication function, safety data can be shared between controllers.

CC-Link IE Field

The new industrial Ethernet field network for intelligent manufacturing systems. Provides real-time integrated distributed control of I/O while also linking numerous networks at gigabit speed.
The safety communication function and motion communication function have been recently added, allowing systems to be configured easily.

CC-Link CC-Link/LT CC-Link Safety

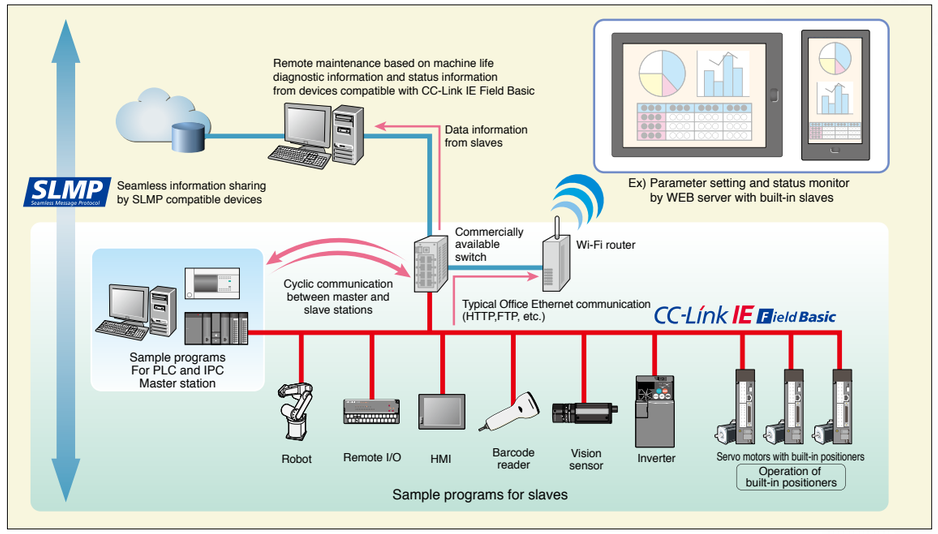
CC-Link is the existing fieldbus network for typical field control applications. CC-Link/LT is a cost saving network for small I/O applications. CC-Link Safety is specialized for use to meet demanding safety network requirements.

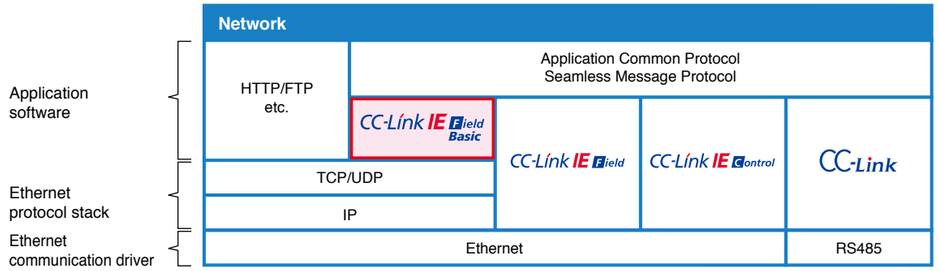
SLMP Seamless Message Protocol

The SLMP (Seamless Message Protocol) is a common protocol for realizing system management and operation regardless of the differences between networks.
SLMP ensures direct transmission of information between production site and IT systems and facilitates extensive information sharing.

CC-Link IE Field Basic | Realizing CC-Link IE communication using general-purpose Ethernet on field networks applicable to small-scale equipment

CC-Link IE communication using general-purpose Ethernet technology. This can easily be applied to small-scale equipment not requiring high-speed control and is easy to use and develop.
Cyclic communication on the CC-Link IE Field network is realized by software.





※SLMP:Seamless Message Protocol

Cyclic communication on CC-Link IE Field network is realized by software.

◎The system can be developed quickly, and a wide lineup of applicable devices can be developed easily.

The communication can be done simultaneously with standard Ethernet TCP/IP communication (HTTP, FTP, etc.).

◎Wiring for control is not required, and the Ethernet network can be unified.

The master station can be easily realized on an IPC or personal computer.

◎The master station can be realized without a dedicated interface board.
*Cyclic communication is implemented as application software with Ethernet based sample source code.

A field network system compatible with standard Ethernet communication can be constructed at low cost.

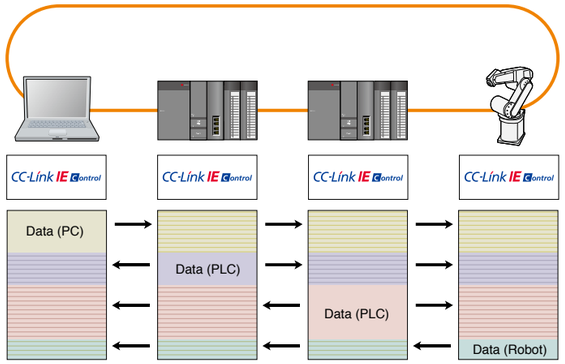
CC-Link IE Control | A wide factory backbone network utilizing gigabit Ethernet technology.

CC-Link IE Control is designed to ensure a highly reliable network through the use of full duplex fiber optic transmission paths, delivering high-speed, high-capacity distributed control.
It's the backbone network that provides assured control of each field network.

Network shared memory for cyclic communication with ultra high speed & ultra large capacity

◎To achieve stable communication independent of transmission delay, CC-Link IE Control adopts a token passing protocol for data transmission control.

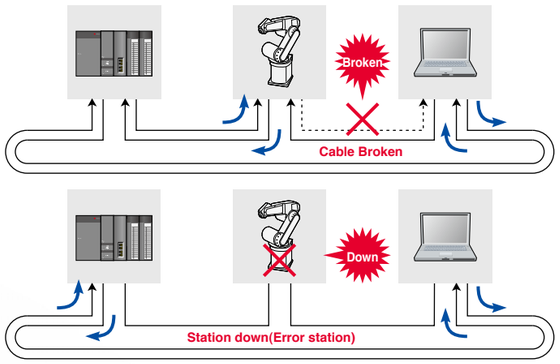
◎Each controller passes data to the network shared memory only when it has the token, ensuring fully deterministic and high speed real-time comunication.



High speed & reliability by redundant fiber optic loop technology

◎By adoption of redundant loop topology, each station continues communication by looping back upon detection of a broken cable or station error.

◎This integrated redundancy is provided without additional equipment and without increasing network cost.

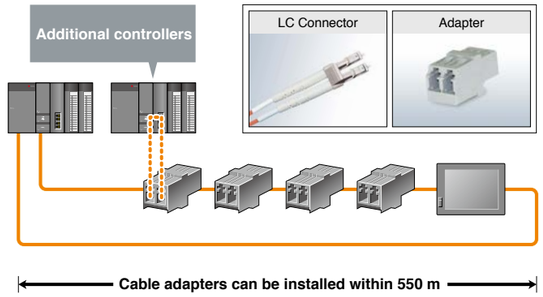


Adoption of standard Ethernet cables, connectors and adapters

◎Worldwide availability of standard Ethernet cabling and parts by using standard Ethernet technology.

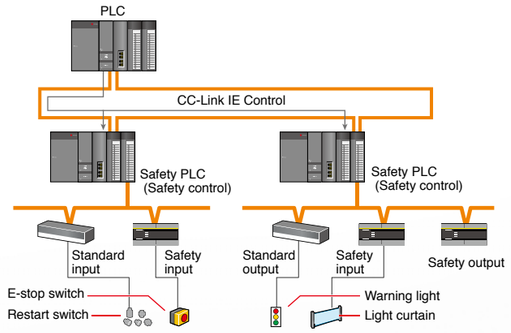
◎By using cable adapters, wiring debugging and installation can be started even if all the equipment in the line has not been fully installed.

■IEEE802.3z (1000BASE-SX)
■LC connector (IEC61754-20)



IEC61508 SIL3 IEC61784-3 (2010) Compliant Safety Communication Function

◎The safety communication function has been added to the CC-Link IE Control network allowing safe communication to be shared between controllers.



CC-Link IE Field

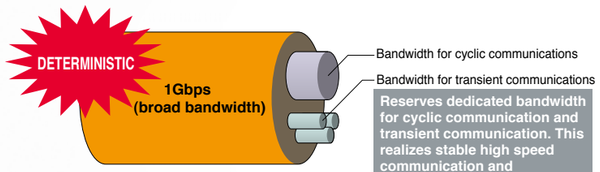
Ultra-high-speed ... supremely useable ... seamless ... and fully compatible with the Ethernet standards We've brought the benefits of “Gigabit & Ethernet” to the field level!

CC-Link IE Field is an ultra high speed & ultra large capacity network, which provides both synchronous deterministic (cyclic) and asynchronous on-demand messaging (transient) communication.
I/O control, motion control and safety functions can be combined seamlessly.

Ultra High Speed

◎Gigabit transmission and real-time protocol enables easy and reliable data communication and remote I/O communication independent of transmission delay.

◎High-speed communication for management information of devices and trace information as well as the transmission of control data.



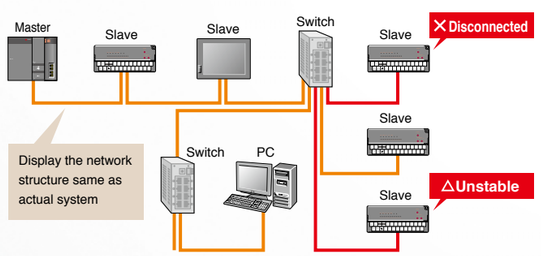
Easy Networking

◎Flexible network topology (ring, line and star are all possible)

◎The network shared memory allows communication among controllers and field devices.

◎Easy configuration and network diagnostics enable a total engineering cost reduction from system start-up to maintenance.

Easy network troubleshooting

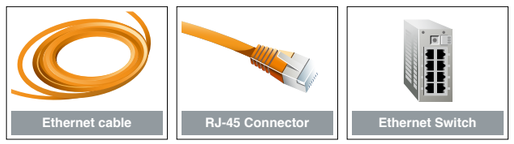


When problems, the cause can be found. System downtime can be minimized.

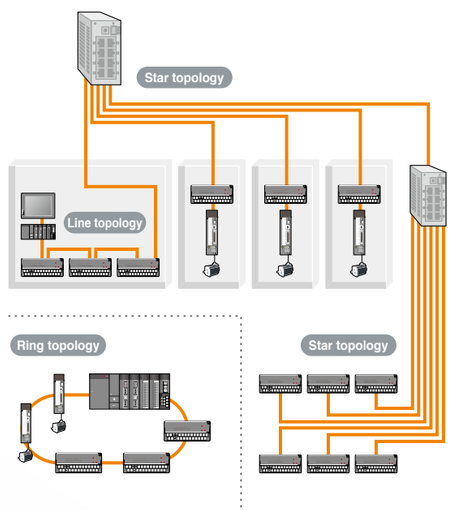
Ethernet Cable and Connector

◎Since the physical and data link layers of the CC-Link IE Field network use standard Ethernet technology, conventional cables, switches and hubs can be used.

◎The availability of materials and selection of equipment for the network installation and maintenance are enhanced.



Flexible network topology



Seamless Networking

◎CC-Link IE Field can access field devices directly with remote engneering tools across the network hierarchy.

◎Devices can be monitored or configured from anywhere in the network, which increases engineering efficiency with remote management.

IEC61508 SIL3 IEC61784-3 (2010) Compliant Safety Communication Function

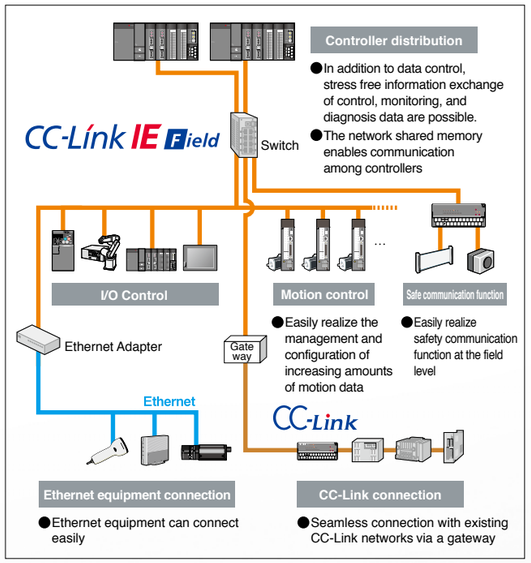
◎The safety communication function has been added to the CC-Link IE Field network allowing safety communication at the field level.

◎Allows flexible configurations of safety and general PLCs on a single network.

Motion communication function capable of highly accurate synchronous communication

◎Highly accurate synchronization is possible by compensating for the delay time in propagating data from the master station to the slave station.

◎Able to combine not only required device synchronization, but also the information of I/O and sensors for which synchronization is not required, on the same CC-Link IE Field network.



CC-Link obtains SEMI certification.
The open field network as a global standard

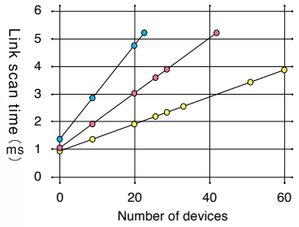
CC-Link is the high-speed field network able to simultaneously handle both control and information data. With a high communication speed of 10 Mbps, CC-Link can achieve a maximum transmission distance of 100 meters and connect to 64 stations.

High-speed and Highly Deterministic Input-Output Response

In addition to high speed 10 Mbps operation, CC-Link is extremely deterministic. Being able to rely on a predictable, unvarying I/O response allows system designers to provide reliable, real-time control.

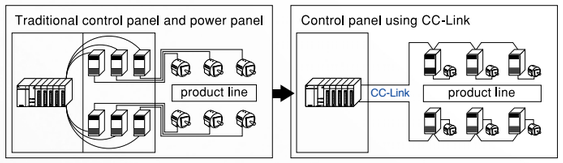
■Link scan time
(at communication speed of 10 Mbps)

- Only remote I/O connected
- Only remote Device connected (Each occupy one station)
- Only Local/ Intelligent Device connected (Each occupy one station)



Efficiency through Reduced Wiring

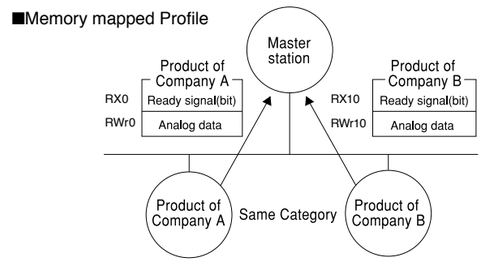
CC-Link significantly reduces the amount of control and power wiring needed in today's complex production lines. It reduces wiring and installation costs, minimizes the work needed to accomplish the wiring and drastically improves maintenance operations.



CC-Link Provides Compatibility between Multiple Vendor Products

CLPA provides a "memory mapped profile" that defines data for each product type. This definition includes the control signal and data layout (addressing). Multiple vendors can develop CC-Link compatible products to match this "profile". Users are then able to easily change from one product brand to another without needing to change connections or control programs.

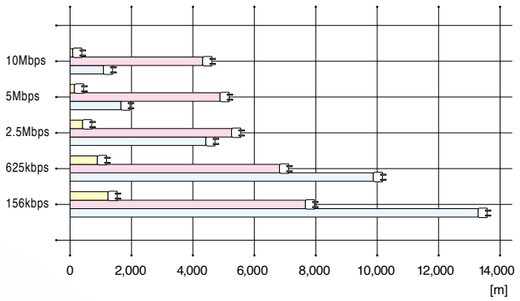
■Memory mapped Profile



Easy to Extend Transmission Distance

The maximum overall cable length is 100 meters when 10 Mbps is selected. This length can be extended to 1.2 km when the network speed is 156 Kbps. The use of cable repeaters and optical repeaters allows even greater distances to be covered. CC-Link supports large-scale applications and reduces the work needed for wiring and device installation.

■CC-Link transmission distance

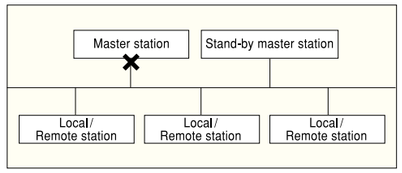


CC-Link Realizes High Reliability with an RAS Function.

The RAS (Reliability, Availability, Serviceability) function is another of CC-Link's features. Functions including stand-by master, detach ment of slave stations, automatic return, testing and monitoring provide a high reliability network system and allow the system down time to be minimized.

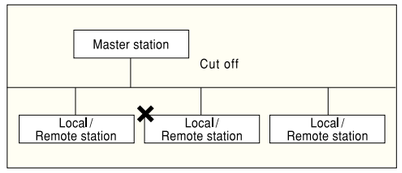
Stand-by Master Function

Using CC-Link, a Stand-by Master station can assume control of network communications in the event that the Primary Master station becomes inoperable.



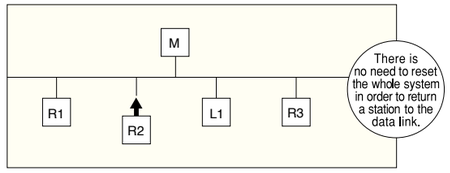
Slave Station Detachment Function

In the event that a slave station stops communicating, CC-Link allows communication to continue with all other stations.



Automatic Return Function

CC-Link automatically returns a detached station to full network operation when the fault is corrected.



Testing and Monitoring Function

This function monitors data link status, and conducts a series of hardware and circuit tests.

CC-Link IE TSN Specification

Item			Specifications
Communication speed			1Gbps/100Mbps
Maximum cyclic size per station			Max. 4G (4,294,967,296) octet in total per station
Transient transmission			With the server function and client function for each station, The transmission capacity is the same as SLMP.
Communication method			Time sharing method
Synchronization function			Compliant with IEEE802.1AS and IEEE1588v2
Number of nodes connected to a single network			64,770 devices (total of master/slave stations) Up to 65535 devices for IP address class A.
Maximum distance between nodes			• Twisted pair cable (compliant with IEEE 802.3): 100 m • Optical fiber (IEEE 802.3 compliant multimode fiber): 550 m • Optical fiber (SI-POF): 20m • Optical fiber (SI-HPCF):100m
Maximum no. of branches			No upper limit
Topology			Line, star, line/star mixed, ring, ring/star mixed, mesh
Connection specifications	Twisted pair cable specifications	Cable specifications	• 1 Gbps: IEEE 802.3 1000BASE-T compliant cable ANSI/TIA/EIA-568-B (Category 5e or higher) compliant shielded or double shielded type is recommended. • 100 Mbps: IEEE 802.3 100BASE-TX compliant cable ANSI/TIA/EIA-568-B (Category 5 or higher) shielded or double shielded type is recommended. Under noise environment, double shielding is recommended.
		Connector specifications	• RJ45 connector(1 Gbps): The shielded RJ45 compliant with ANSI/TIA/EIA-568-B 8-pin connectors is recommended. • RJ45 connector (100 Mbps): The shielded RJ45 compliant with the ANSI/TIA/EIA-568-B 4-pin or 8-pin connector is recommended. • M12 connector (1 Gbps): The X-Coding 8-pin connector compliant with IEC 61076-2-109 is recommended. • M12 connector (100 Mbps): The D-Coding 4-pin connector compliant with IEC 61076-2-101 or X-Coding 8-pin connector compliant with IEC 61076-2-109 is recommended.
	Optical fiber cable specifications（1Gbps）	Optical fiber specification	Optical fiber cable compliant with IEEE 802.3 1000BASE-SX (MMF)
		Standard	IEC 60793-2-10 Types A1a.1 (50/125 μm multimode)
		Transmission loss (max)	3.5 (dB/km) or less (λ = 850 nm)
		Transmission band (min)	500 (MHz/km) or higher (λ = 850 nm)
		Optical fiber specification	GI type plastic optical fiber cable (GI -POF)
		Standard	Proposing IEC 60793-2-40 (core 55 μm, external diameter 490 μm multimode)
		Transmission loss (max)	100 (dB/km) or less (λ = 850 nm)
		Transmission band (min)	350 (MHz/km) or higher (λ = 850 nm)
		Connector specifications	Duplex LC type connector
		Standard	IEC 61754-20: Type LC connector
		Connection loss	0.3 (dB) or less
		Polished surface	PC polishing
	Optical fiber cable specifications（100Mbps）	Optical fiber specification	SI type plastic optical fiber cable (SI-POF)
		Standard	—
		Transmission loss (max)	170 (dB/km) or less (λ = 650 nm)
		Transmission band (min)	10 (MHz/km) or higher (λ = 650 nm)
		Optical fiber specification	SI type plastic clad fiber cable (SI-PCF)
		Standard	—
		Transmission loss (max)	19 (dB/km) or less (λ = 650 nm)
		Transmission band (min)	14 (MHz/km) or higher (λ = 850 nm)
		Connector specifications	F07 type connector
		Standard	IEC 61754-16: Type PN connector
		Connection loss	0.8 (dB) or less (for master fiber)
		Polished surface	Not defined

*1. For the ring/star mixed and mesh wiring, use switches that can configure each topology.

CC-Link IE Control Network Specifications

Item			Specifications
Communication speed/data link control			1Gbps / Standard Ethernet
Communication control method			Token passing method
Communication control method			Ring
Redundant system function			Redundant data transfer as standard
Number of connected stations per network			Up to 120 stations
Max. number of networks			239
Max. number of groups			32
Optical fiber cable	Optical fiber specification		Optical fiber cable for 1000BASE-SX (MMF)
		Standard	IEC60793-2-10 Types A1a.1（50/125μm multimode）
		Transmission loss (max)	3.5(dB/km) or less (λ=850nm)
		Transmission band (min)	500(MHz-km) or more (λ=850nm)
	Total length (total length of optical cable)		66 km (when 120 stations connected)
	Maximum distance between nodes		550 m (core/clad=50/125(μm))
	Connector specifications		Duplex LC connector
		Standard	IEC61754-20:Type LC connector
		Connection loss	0.3（dB） or less
		Polished surface	PC polishing
	Transmission line type		Dual loop
Twisted pair cable	Communication medium		Shielded twisted pair cable (category 5e)
	Connector		RJ45 connector, M12 X-Code connector
	Total length		12,000m
	Distance between stations (max.)		100m
Cyclic communication (Max. number of link points per network)			Control data (Max. number of link points)
			LB：32768 bits
			LW：131072 words
			LX：8192 bits
			LY：8192 bits
Maximum number of link points per station		LB	16384 bits
		LW	16384 words
		LX	8192 bits
		LY	8192 bits

The CC-Link IE Control network achieves a communication speed of 1 Gbps. It uses token passing as the data transfer control method. This prevents frame collisions, improving the throughput of communication. Therefore, it is optimal for networks where regularly scheduled communication is required.

CC-Link IE Field Network Specifications

Item	Specifications
Ethernet Standards	IEEE802.3ab (1000BASE-T) compliant
Communication speed	1Gbps
Communication media	Shielded twisted pair cable (Category 5e), RJ-45 connector
Communication control method	Token passing method
Topology	Line, star, ring
Maximum number of connected units	254 modules (total of master and slave stations)
Maximum station-to-station distance	100m
Cyclic communication (Master slave method)	Control signal (bit data): max. 32768 bits (4096 octets) RX (slave → master): 16384 bits RY (master → slave): 16384 bits Control data (word data): Max. 16384 words (32768 octets) RWr (slave → master): 8192 words RWw (master → slave): 8192 words
Transient communication (message communication)	Message size: Max. 2048 octets

CC-Link IE Field Basic Specifications

Item		Specifications
Communication speed		100Mbps
Implementation method		Software
Connection form		Star (connection with switching hub)
Cable		Ethernet category 5e or higher
Max. number of connected stations per network (open specification)		64
Cyclic communication		Supported
Max. number of link points/network	RX,RY	512 octets each (4K points)
	RWr,RWw	4K octets each (2K points)
Max. number of link points/station (More than one station can be occupied.)	RX,RY	8 octets each (64 points) (fixed)
	RWr,RWw	64 octets each (32 points) (fixed)
Link scan time (16 stations connected)		10ms
Transient transmission		Possible (max. 2K octets)
Mix of communication protocols, TCP and IP		Supported

CC-Link Specification

<table>
<tr><th colspan="4" rowspan="2">Item</th><th colspan="5">Specification</th></tr>
<tr><th>Ver. 1.10</th><th colspan="4">Ver. 2.00</th></tr>
<tr><td rowspan="15">Control specification</td><td colspan="2" rowspan="3">Maximum number of link points</td><td>Remote I/O(RX, RY)</td><td>2048 points each</td><td colspan="4">8192 points each</td></tr>
<tr><td>Remote register (RWr)</td><td>256 words</td><td colspan="4">2048 words (Slave station to Master station)</td></tr>
<tr><td>Remote register(RWw)</td><td>256 words</td><td colspan="4">2048 words (Master station to Slave station)</td></tr>
<tr><td colspan="3">Extended cyclic setting</td><td>–</td><td>1 time setting</td><td>2 time setting</td><td>4 time setting</td><td>8 time setting</td></tr>
<tr><td rowspan="8">Number of link points per unit</td><td rowspan="2">1 station occupied</td><td>RX, RY</td><td colspan="2">32 points each</td><td>32 points each</td><td>64 points each</td><td>128 points each</td></tr>
<tr><td>RWr, RWw</td><td colspan="2">4 words each</td><td>8 words each</td><td>16 words each</td><td>32 words each</td></tr>
<tr><td rowspan="2">2 stations occupied</td><td>RX, RY</td><td colspan="2">64 points each</td><td>96 points each</td><td>192 points each</td><td>384 points each</td></tr>
<tr><td>RWr, RWw</td><td colspan="2">8 words each</td><td>16 words each</td><td>32 words each</td><td>64 words each</td></tr>
<tr><td rowspan="2">3 stations occupied</td><td>RX, RY</td><td colspan="2">96 points each</td><td>160 points each</td><td>320 points each</td><td>640 points each</td></tr>
<tr><td>RWr, RWw</td><td colspan="2">12 words each</td><td>24 words each</td><td>48 words each</td><td>96 words each</td></tr>
<tr><td rowspan="2">4 stations occupied</td><td>RX, RY</td><td colspan="2">128 points each</td><td>224 points each</td><td>448 points each</td><td>896 points each</td></tr>
<tr><td>RWr, RWw</td><td colspan="2">16 words each</td><td>32 words each</td><td>64 words each</td><td>128 words each</td></tr>
<tr><td colspan="3">Maximum number of occupied stations</td><td colspan="5">4 stations</td></tr>
<tr><td rowspan="15">Communication specification</td><td colspan="3">Communication speed</td><td colspan="5">10M / 5M / 2.5M / 625k / 156kbps</td></tr>
<tr><td colspan="3">Communication system</td><td colspan="5">Broadcast polling system</td></tr>
<tr><td colspan="3">Synchronization system</td><td colspan="5">Frame synchronization system</td></tr>
<tr><td colspan="3">Encoding system</td><td colspan="5">NRZI</td></tr>
<tr><td colspan="3">Transmission path format</td><td colspan="5">Bus format (EIA RS485 conformance)</td></tr>
<tr><td colspan="3">Transmission format</td><td colspan="5">HDLC conformance</td></tr>
<tr><td colspan="3">Error control system</td><td colspan="5">CRC ($X^{16}+X^{12}+X^5+1$)</td></tr>
<tr><td colspan="3">Max. number of units connected</td><td colspan="5">64 units</td></tr>
<tr><td colspan="3">The number of slave station</td><td colspan="5">1-64</td></tr>
<tr><td colspan="3">Max. overall cable extension length and inter-station cable length</td><td colspan="5">Master station / Remote I/O station or Remote device station / Remote I/O station or Remote device station / Local station or Intelligent device station / Local station or Intelligent device station
Inter-station cable length
Max. overall cable extension length
CC-Link Ver. 1.10 compatible cable (Using 110Ω terminators)
Communication speed | inter-station cable length | Max. overall cable extension length
156Kbps | 20 cm or longer | 1200m
625Kbps | 900m
2.5Mbps | 400m
5Mbps | 160m
10Mbps | 100m
If a system uses modules compatible with Ver. 1.00, 1.10 and Ver. 2.00, and cables compatible with Ver. 1.00 and 1.10, then follow the Ver. 1.00 specification for maximum overall cable extension length and inter-station cable length.</td></tr>
<tr><td colspan="3">Connection cable</td><td colspan="5">CC-Link Ver. 1.10 compatible cable (Shielded, 3-core twisted pair cable)
* Mixture of different brand cables is possible only when they are all Ver. 1.10 compatible cables.</td></tr>
</table>

Difference between CC-Link Ver.1.10 and Ver.2.00 in the number of connected units

	Number of units connected
Ver.1.10	Max. 64 stations. It should satisfy the conditions below. 1. Number of all stations a+b×2+c×3+d×4≤64 a : Number of units that occupies 1 station, b : Number of units that occupies 2 stations c : Number of units that occupies 3 stations, d : Number of units that occupies 4 stations 2. Number of units connected 16×A+54×B+88 C≤2304 A : Number of remote I/O station units ····· Max. 64 units B : Number of remote device station units ····· Max. 42 units C : Number of local station, stand by master station and intelligent device station units ···· Max. 26 units
Ver.2.00	Max. 64 stations. It should satisfy the conditions below. 1. Number of all stations (a+a2+a4+a8)+(b+b2+b4+b8)×2+(c+c2+c4+c8)×3+(d+d2+d4+d8)×4≤ 64 2. Total number of remote I/O points (a×32+a2×32+a4×64+a8×128)+(b×64+b2×96+b4×192+b8×384) +(c×96+c2×160+c4×320+c8×640)+(d×128+d2×224+d4×448+d8×896)≤ 8192 3. Total number of remote register points (a×4+a2×8+a4×16+a8×32)+(b×8+b2×16+b4×32+b8×64) +(c×12+c2×24+c4×48+c8×96)+(d×16+d2×32+d4×64+d8×128)≤ 2048 a : The number of units with 1 station occupied and 1 time setting b : The number of units with 2 stations occupied and 1 time setting c : The number of units with 3 stations occupied and 1 time setting d : The number of units with 4 stations occupied and 1 time setting a2: The number of units with 1 station occupied and 2 times setting b2: The number of units with 2 stations occupied and 2 times setting c2: The number of units with 3 stations occupied and 2 times setting d2: The number of units with 4 stations occupied and 2 times setting a4: The number of units with 1 station occupied and 4 times setting b4: The number of units with 2 stations occupied and 4 times setting c4: The number of units with 3 stations occupied and 4 times setting d4: The number of units with 4 stations occupied and 4 times setting a8: The number of units with 1 station occupied and 8 times setting b8: The number of units with 2 stations occupied and 8 times setting c8: The number of units with 3 stations occupied and 8 times setting d8: The number of units with 4 stations occupied and 8 times setting 4. Number of units connected 16×A+54×B+88×C≤ 2304 A : Number of remote I/O station units ····· Max. 64 units B : Number of remote device station units ····· Max. 42 units C : Number of local station, stand by master station and intelligent device station units ····· Max. 26 units *In the case of units compatible with Ver. 1, the number is calculated with one time setting.

CC-Link Ver. 1.00 model (Differences from Ver. 1.10)

There are two differences in specifications between CC-Link Ver. 1.10 and Ver. 1.00 as shown below.

- Max. overall cable extension length and inter-station cable length
- Connection cable

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Max. overall cable extension length and inter-station cable length</td><td>Master station / Remote I/O station or Remote device station / Remote I/O station or Remote device station / Local station or Intelligent device station / Local station or Intelligent device station
*2 *1 *2 *2
Max. overall cable extension length
*1: Inter-station cable length between remote I/O or remote device stations
*2: Inter-station cable length between the master station and a local station or between an intelligent device station and the precedingor following station
Ver.1.00 compatible CC-Link dedicated cable(Characteristic Impedance: 100Ω type)
Communication speed | inter-stationcable length *1 | inter-stationcable length *2 | Max. overall cable extension length
156Kbps | 30 cm or over | 1 m or over (A) / 2 m or over (B) | 1200 m
625Kbps | | | 600 m
2.5Mbps | | | 200 m
5Mbps | 30 cm to 59 cm* | | 110 m
60 cm or over | | | 150 m
10Mbps | 30 cm to 59 cm* | | 50 m
60 cm to 99 cm* | | | 80 m
1 m or over | | | 100 m
(A): 1 m or longer: In the case of a system comprising only remote I/O or remote device stations
(B): 2 m or longer: In the case of a system comprising local and intelligent device stations
*: If even a cable between remote I/O or remote device stations is to be wired within this range, the maximum overall cable length shown above applies.</td></tr>
<tr><td>Connection cable</td><td>CC-Link Ver. 1.10 compatible cable (Shielded, 3-core twisted pair cable)
*Only single vendor use in case of Ver.1.00 cable.</td></tr>
</table>

●How to become a member

Would you like to improve your FA, BA, and PA devices by making them compatible with the CC-Link Family? Are you interested in open FA devices that satisfy international standards? CLPA will support you by promoting related technologies and holding exhibitions and seminars in Japan and overseas.

◎ How to apply for a membership: Please access from our website.

※FA:Factory Automation / BA:Building Automation / PA:Process Automation

https://www.cc-link.org

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New publication, effective Nov. 2020
Specifications subject to change without notice

CC1011-04-AC