

Open Network for High-Speed Control

CompoNet

Fast and Intelligent



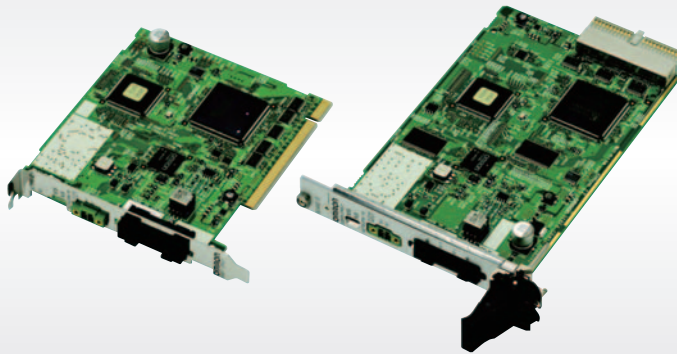
News Topics

New Products

NEW

CompoNet Master Board for PCI Bus and CompactPCI Bus

The communication speed of 1 ms per 1000 points and the communications cycle time optimization realized super high speed control by computers.



CompoNet Master Board for PCI Bus
3G8F7-CRM21

CompoNet Master Board for CompactPCI Bus
3G8F8-CRM21

Available in 2 types: one for PCI Bus and the other for CompactPCI Bus

Operable both in Windows OS, and in other OS by accessing to shared memory.

Programmable by C/C++/ or VB.

The communication cycle time optimization further speeded up CompoNet. Combined use with a computer realized the higher speed control than ever.

NEW

Innovation in wiring! Fast, low-cost, and compact Bit Slave Units CRT1B-series

Ultra-compact size

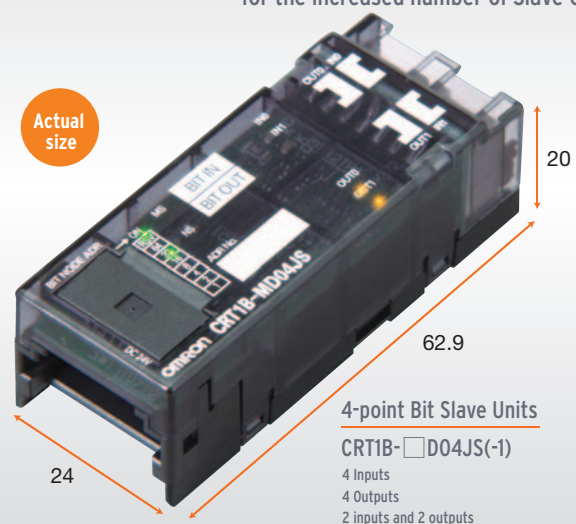
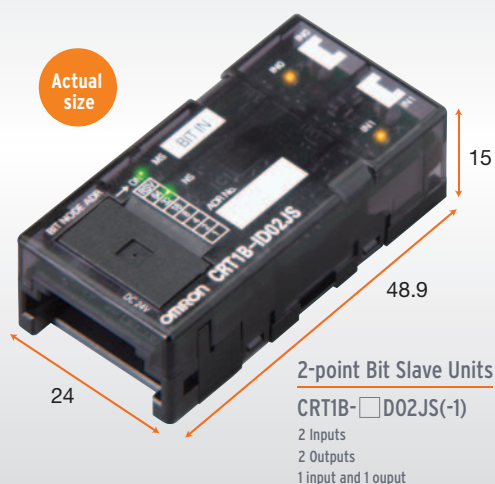
Smallest in the industry

Low cost

Using round cables

High speed

Maintains high speed communications for the increased number of Slave Units



In August 2009, CompoNet was established as the International Standard IEC/PAS62026-7.

Manufacturing Site Moving into the Global Open Netwo

Information layer
Controller layer



Device layer



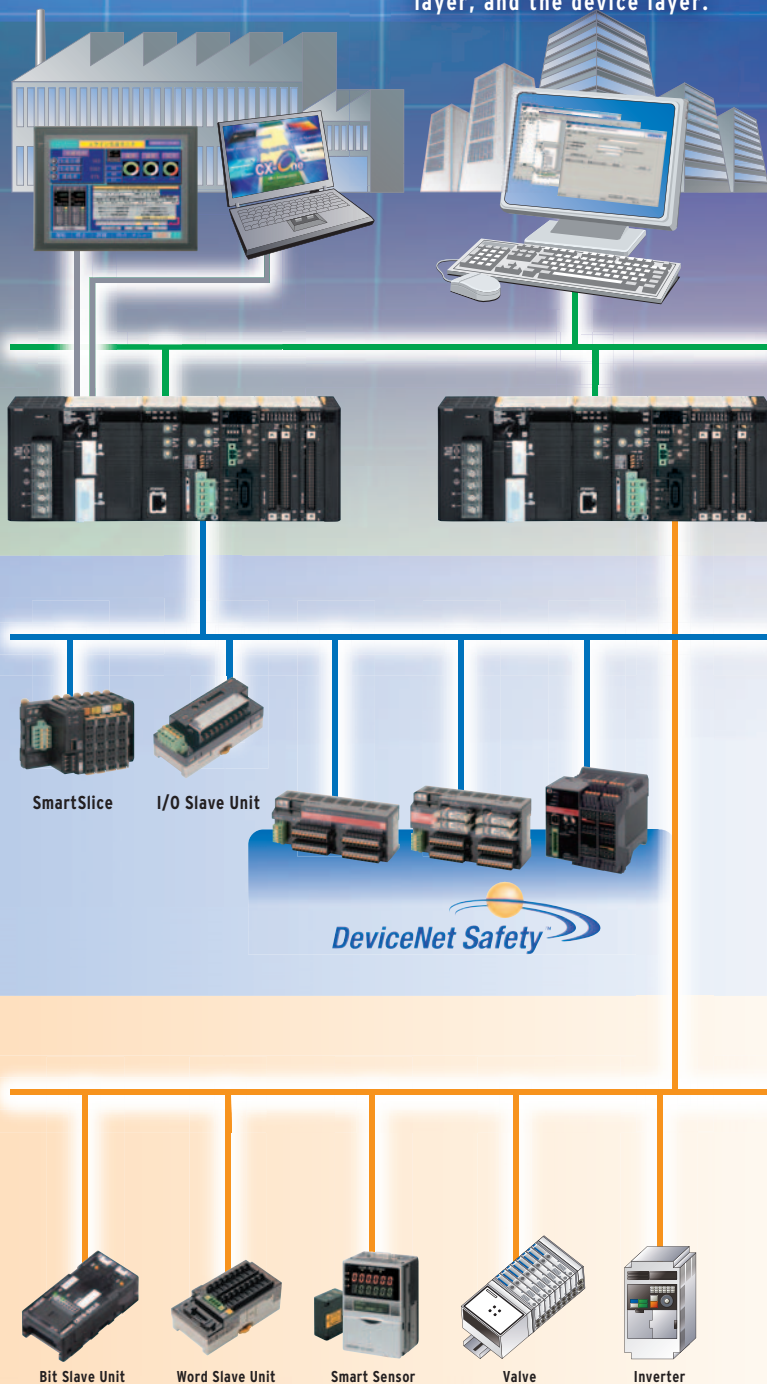
Sensor & Actuator layer



CompoNet

Network Era

The drastic changes to the environment faced by today's manufacturing industry has led a wide range of issues such as the standardization of system infrastructure and the shift to more advanced functions. In order to solve these issues, it is necessary to share on-site data, such as for product quality and how to respond to changes in the environment, to vertically start up devices utilizing this data and execute preventive maintenance universally and quickly. That is why attention is focusing on utilizing globally standardized "open networks" in the plant management layer, the control layer, and the device layer.



"CompoNet" globally standardized open network in the sensor & actuator layer —「CompoNet」—

CompoNet was established as the International Standard IEC/PAS62026-7 in August 2009.

CompoNet is the latest sensor & actuator layer open network. It was introduced and its specifications given by ODVA *1 in 2006.

This open network fuses CIP network technology *2 and high-level communications technology that consolidates the know-how for reducing the amount of wiring developed over many years at actual manufacturing sites. It was established and released as the International Standard IEC/PAS62026-7 in August 2009.

CompoNet attains the industry's fastest class of communications, 1000 signals per ms between connected devices and the controller and provides a high-performance network environment never seen before.

The open network means reduced device costs, improved functions, the quality of procurement on a global level, and standardization turns design know-how into assets.

With the rapid expansion of family devices by many control equipment makers in Japan and overseas, CompoNet is establishing a multi-vendor environment that is a truly global open network.

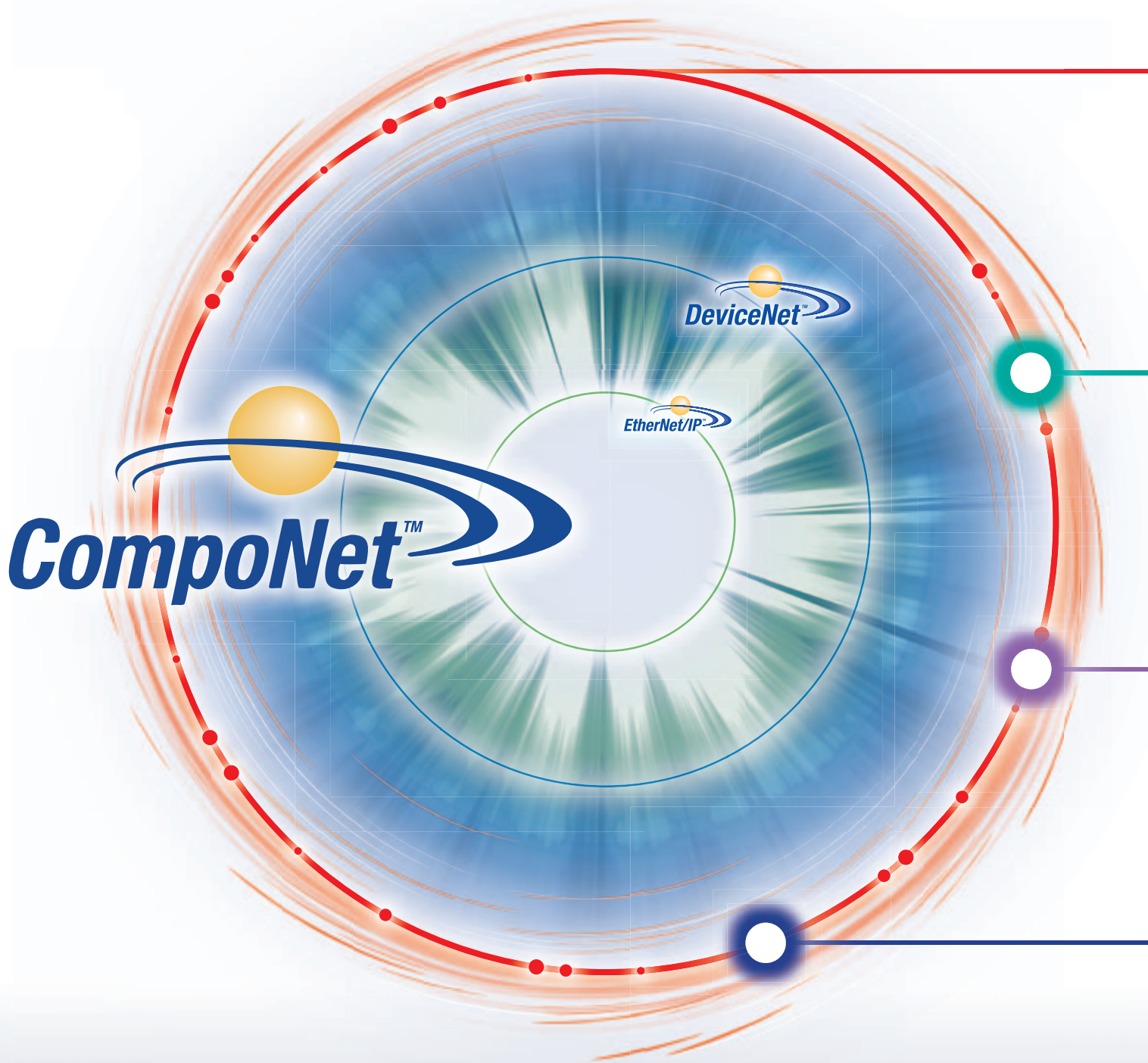
*1 The abbreviation for Open DeviceNet Vendor Association, a non-profit organization in the United States. ODVA supports networks based on CIP technology and is run by the main vendors inside and outside Japan. It has active bases in America, Europe, China, South Korea, and Japan.

*2 CIP is the abbreviation for Common Industrial Protocol. This is a protocol that enables communications between open networks of equipment from multiple vendors. Control of each piece of equipment, programming, data collection, etc. can be standardized free of any restrictions due to the network type of differences among equipment.

Note: CompoNet, DeviceNet, and EtherNet/IP are registered trademarks of ODVA. ODVA Website: <http://www.odva.org/>

The conventional fast communication networks exceeding 10 Mbps must use special cables, which place restrictions on wiring. For example, they do not allow the connecting of branches.

In order to be able to use regular cables with their easier wiring, the only choice is a low baud rate network. With conventional field networks, achieving a "high-speed" while maintaining "ease of wiring", "informatization", and "low cost" is difficult. CompoNet achieves these competing conflicting objectives thanks to the latest technology for raising the efficiency of communication lines. CompoNet makes it possible to construct the manufacturing systems of the near future.



Fast Communication

1024 points in 1 ms: fastest class in the industry

CompoNet

solves the problems of conventional field networks!

Wiring

Superior branching

Informatization

Device preventive maintenance

Simple and Low-Cost

Simple installation and regular cables mean lower cost

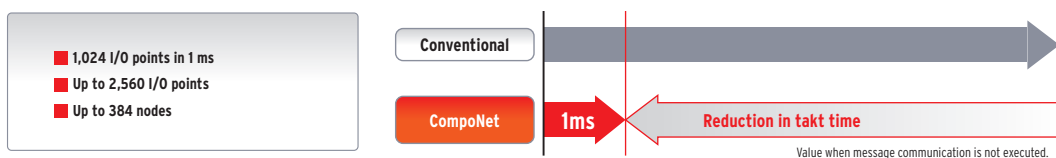
Fast Communication

Fast multipoint communication reduces takt times

Fastest Communication Speeds in the Industry

Provides the fastest communication speeds in the industry for a sensor-actuator level network.

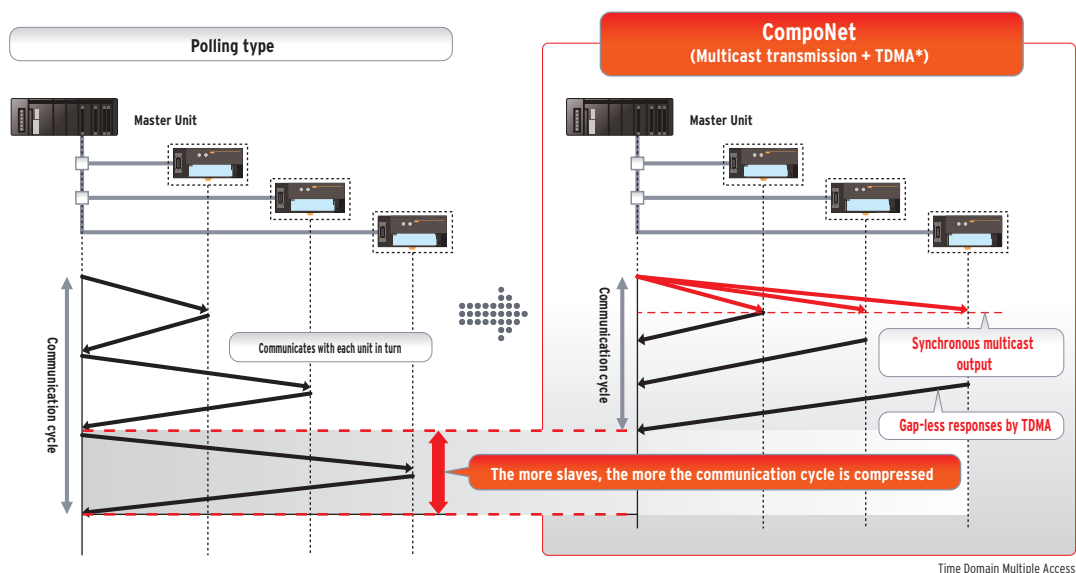
It is possible to send data consisting a large number of control points on multiple nodes. There is no response time delay, even with repeater units.



Fast Communication Technology even at Low Baud Rate of 4 Mbps

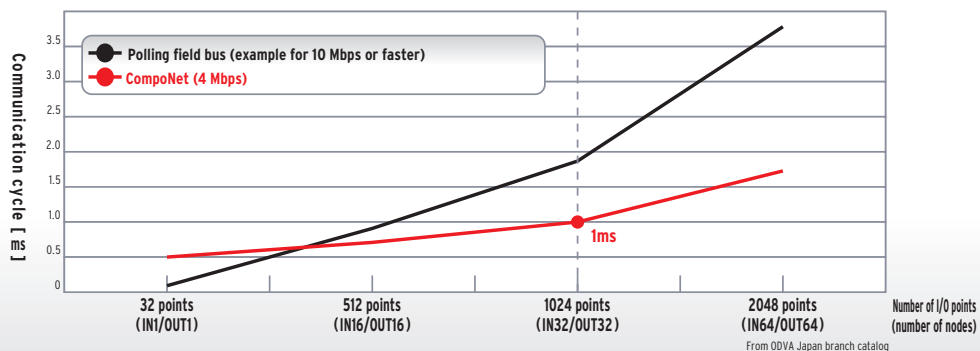
Provides excellent performance in applications with large numbers of control points and also in expansion work.

Efficient multicast transmission enables stable and fast communication even when the number of slaves increases.



Advantage of high-speed CompoNet technology

1 Fast communication is maintained even with an increased number of control points.



- 2 Easier wiring (branching is possible even in fast mode)
- 3 Regular cables can be used.
- 4 High resistance to noise.

Wiring

Superior branching adaptability reduces wiring work

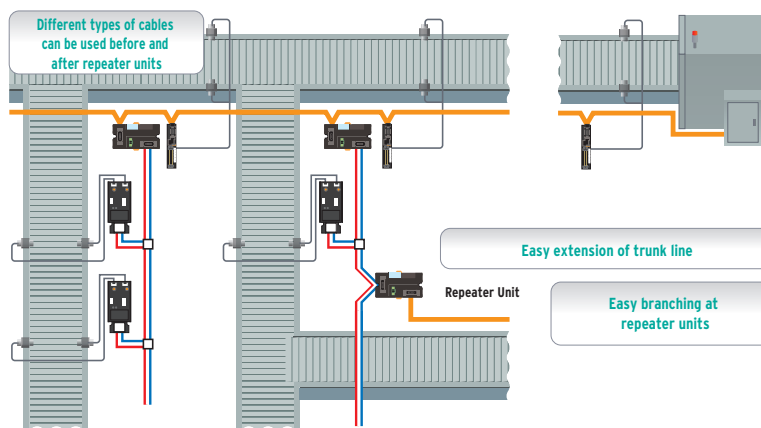
Flexible Installation

Select the best branching method for your application.

CompoNet provides both fast communication and easy wiring.
Branch wiring is a powerful tool for installing large numbers of slaves in a variety of locations.
You can optimize your cable layout to match the layout of your equipment.

Distance can easily be extended.

A maximum distance of 1500 m is possible (when baud rate is 93.75 kbps).



Select the best branching method for your application



Flat Connector Socket
+ Fat Connector Plug

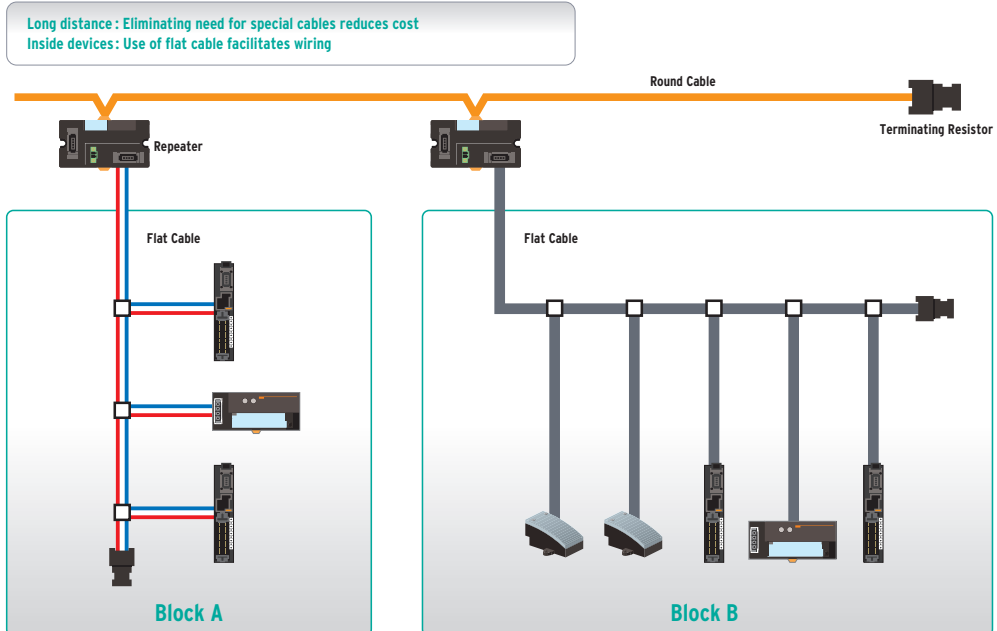


Multidrop Type



Repeater Unit

Different types of cables can be mixed.

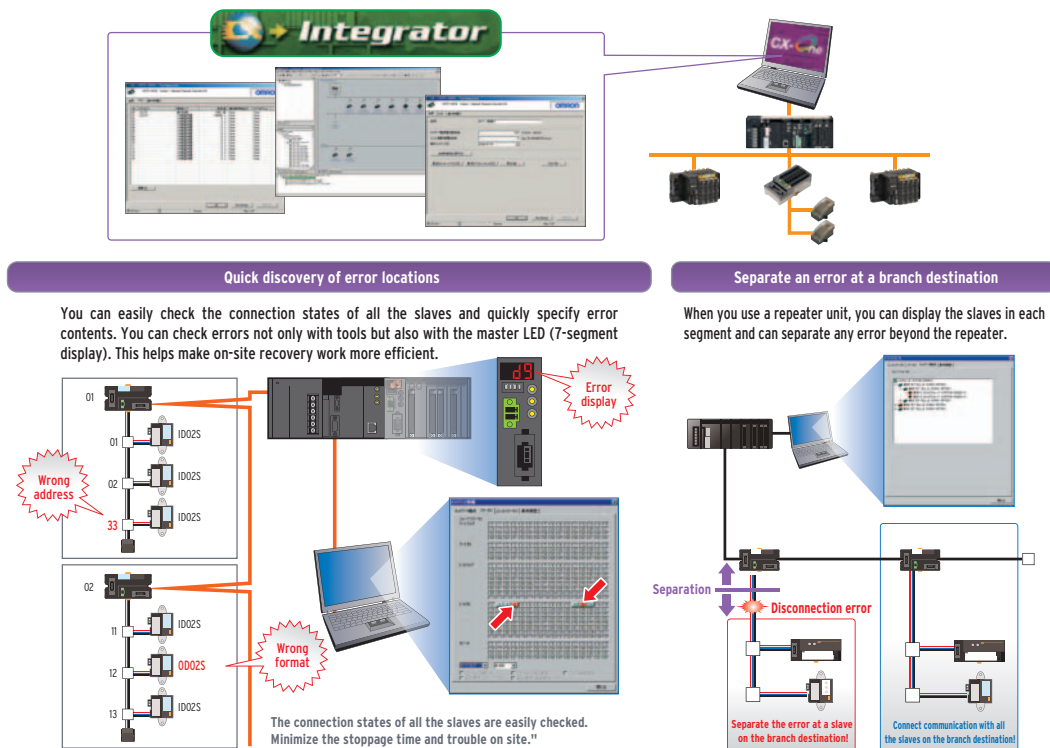


Informatization Reducing the start-up time and maintenance work with informatization

CX-Integrator Makes Start-Up and Recovery Work More Efficient

CX-Integrator software lets you set the PLC network/serial communication system configuration from a computer.

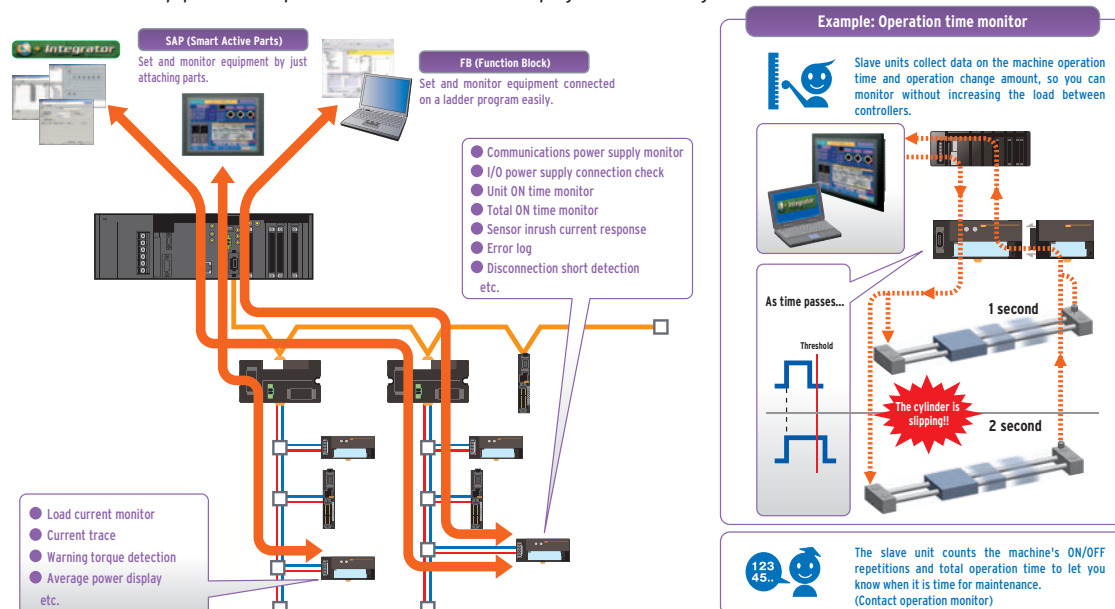
CX-Integrator makes it easy to handle CompoNet assignment, parameter setting, connection state monitoring, comment setting, network diagnosis, etc. from a computer.



Informatization of the all Equipment

Smart features are features of the slave main units that collect a variety information used for from start-up to maintenance.

Monitor network power supply voltage with tools and display units. Slaves collect a variety of information helpful for preventive maintenance and detect errors in connected equipment before problems occur. No need to write a program for monitoring.



Simple and Low-Cost Slashes start-up workload and equipment cost!

Flat Cable for Easy One-Touch Installation

Flat cable shortens installation time.
It also prevents connector installation mistakes.

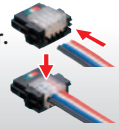
- Shield cable for field networks**
- 1 Peel away the cable coating.
 - 2 Take out the shield wire.
 - 3 Peel away the lead coating.
 - 4 Attach the 5 crimp terminals.
 - 5 Insert the cable and fasten with 5 screws.



Flat cable

Slashes installation work to 1/30 of the required time!

- 1 Insert the cable into the connector.
- 2 Snap fit with tool. **Snap**



Smooth Start-Up with Simple Setup

Just set the master baud rate and the slave node addresses and the system is ready for start-up.
The slave baud rate is automatically set to match the master unit baud rate.
The allocation areas are automatically set by the node addresses.

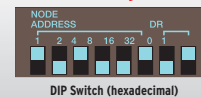


*1. Using CX-Integrator makes detailed settings and monitoring possible.

Rotary switch used Easy-to-understand decimal switch

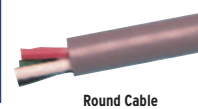
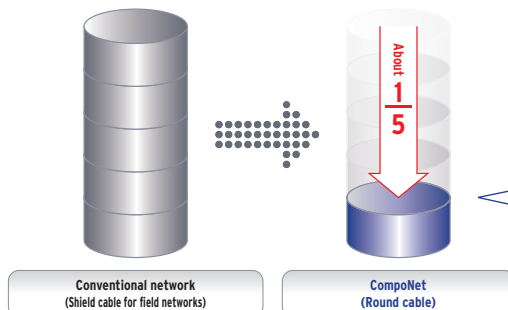


Reduces setting mistakes.



Can Use Regular Round Cables for Fast Communication

Regular round cables can be used as the communication cables.

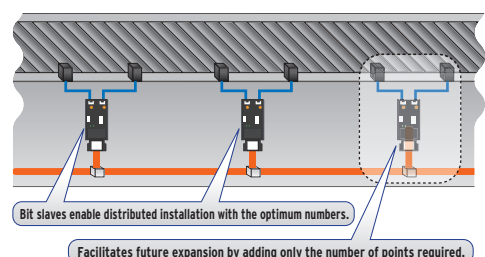
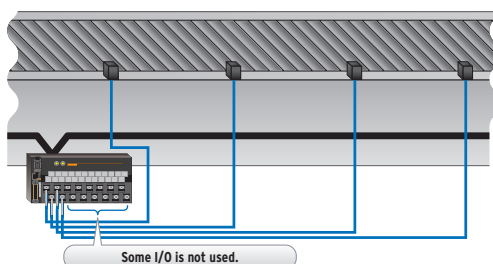


- Can use regular cables that are inexpensive and easy to find.
- Uses round cables (4-wire) to supply power to the slave units.
- Can also use regular highly flexible cables and oil-resistant cables.
- When communication power is supplied to the slaves, round cables (2-wire) can also be used.

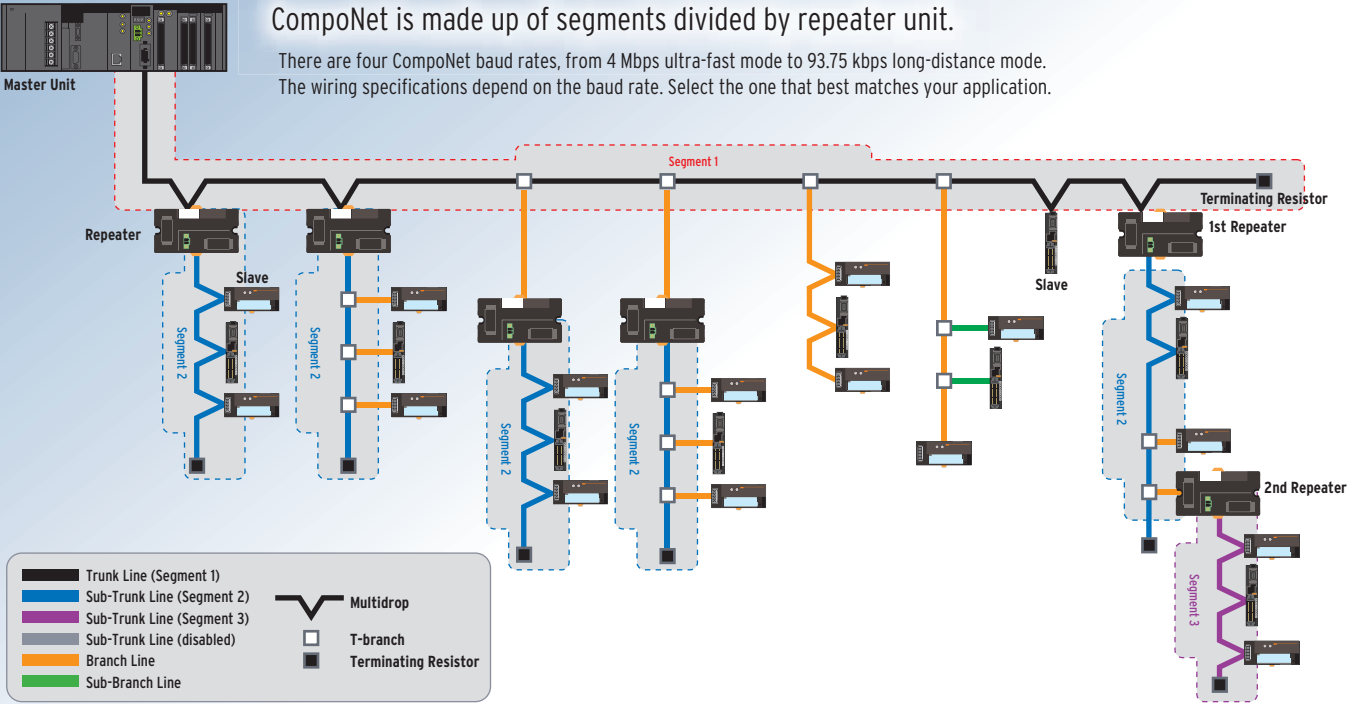
* Use round cables that comply with ODVA specifications.

Bit-level distribution for effective I/O installation

Bit slaves enable optimum I/O configuration and wiring becomes more efficient.



Network Specifications



Baud rate	Cable type	Trunk line and sub-trunk line length (When 2 repeaters are used.)	Number of slaves per segment (Including number of repeaters)	Branch line length	Total branch line length per segment	Branch location restrictions	Number of slaves per branch line	Sub-branch line length	Total sub-branch line length per segment
4Mbps	Round cable I, II Flat cable I, II	30m (90m)	32	—	—	—	—	—	—
3Mbps	Round cable I, II Flat cable I, II	30m (90m)	32	0.5m	8m	3/meter	1	—	—
1.5Mbps	Round cable I	Without branches	100m (300m)	—	—	—	—	—	—
		With branches	30m (90m)	2.5m	25m	3/meter	3	—	—
	Round cable II Flat cable I, II	30m (90m)	32	2.5m	25m	3/meter	3	0.1m	2m
93.75kbps	Round cable I	500m (1500m)	32	6m	120m	3/meter	1	—	—
	Round cable II Flat cable I, II	200m (600m)	32	200 meter free wiring total wire length per segment					

Relation between Baud Rate and Communications Cable

The Cable that can be used and the required baud rates are automatically determined by whether a trunk line-branch line formation or an unrestricted wiring formation is used.

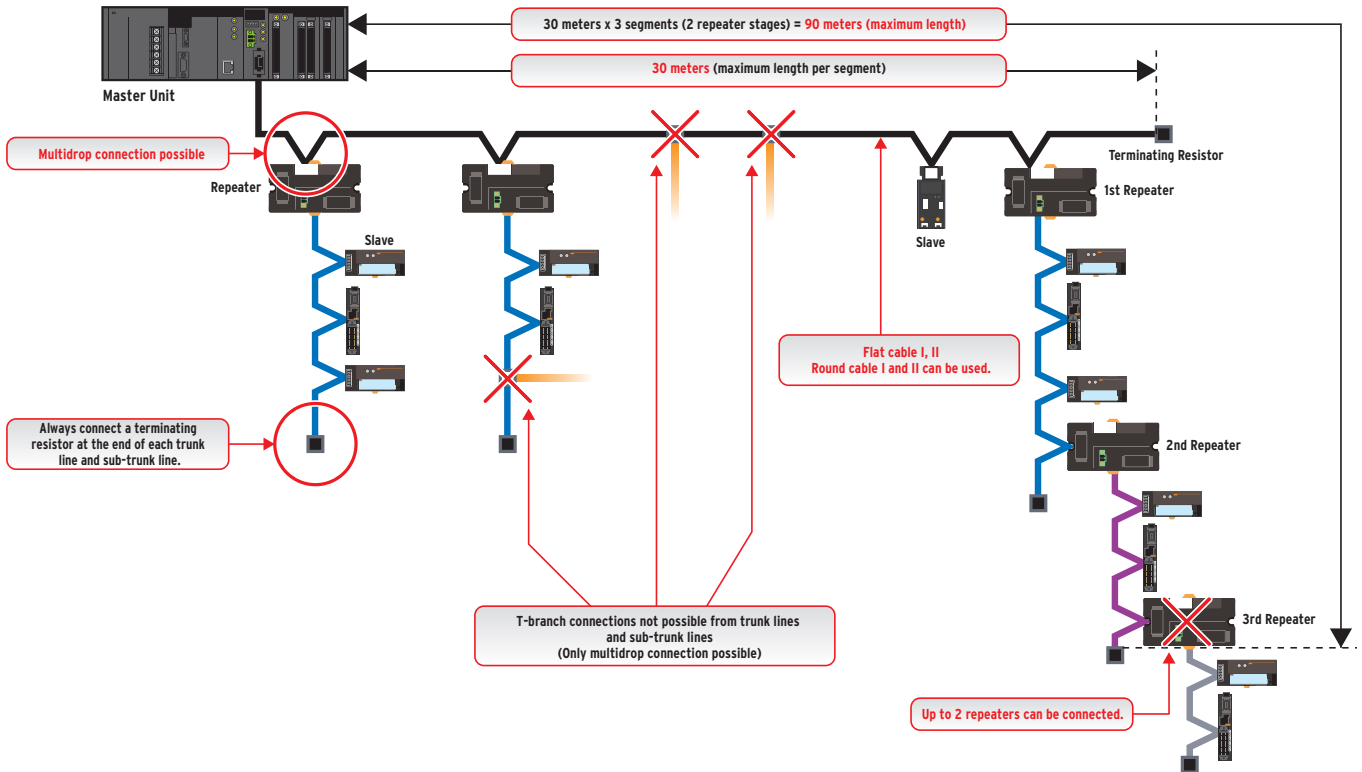
Cable type	Baud rate			
	4Mbps	3Mbps	1.5Mbps	93.75kbps
Round cable I	Trunk line-branch line wiring formation (See note 1.)	Trunk line-branch line wiring formation	Trunk line-branch line wiring formation	Trunk line-branch line wiring formation
Round cable II				Unrestricted wiring formation
Flat cable I				
Flat cable II	Trunk line-branch line wiring formation (See note 2.)			

Note: (1) If a baud rate of 4 Mbps is used, branching is not possible from the trunk line. (Only multidrop connections are possible.)
(2) If a baud rate of 4 Mbps is used, branching and multidrop connections are not possible from the trunk line. (There are no Multidrop Connectors for Flat Cable II.)

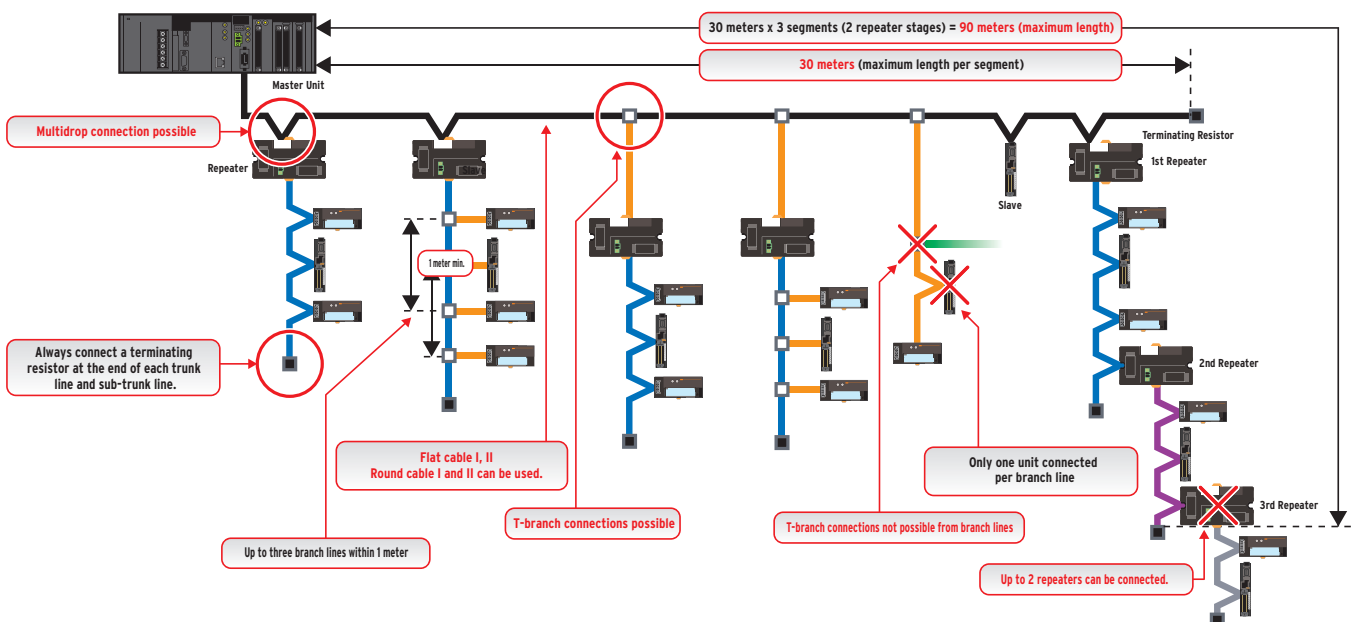
The following table shows the conditions and restrictions for each formation.

Item	Wiring formation	
	Trunk line-branch line formation	Unrestricted wiring formation
Master Unit location	End of network	Anywhere in network (not necessarily at the end)
Maximum number of Slave Units connected to any one branch line	1 or 3 depending on the cable type and baud rate	No restrictions
Terminating Resistor location	On the opposite ends of the trunk line and all sub-trunk lines from the Master Unit and each Repeater Unit	On the most remote ends from the Master Unit and each Repeater Unit

Example of wiring for 4Mbps (Application: Ultra-fast communications)

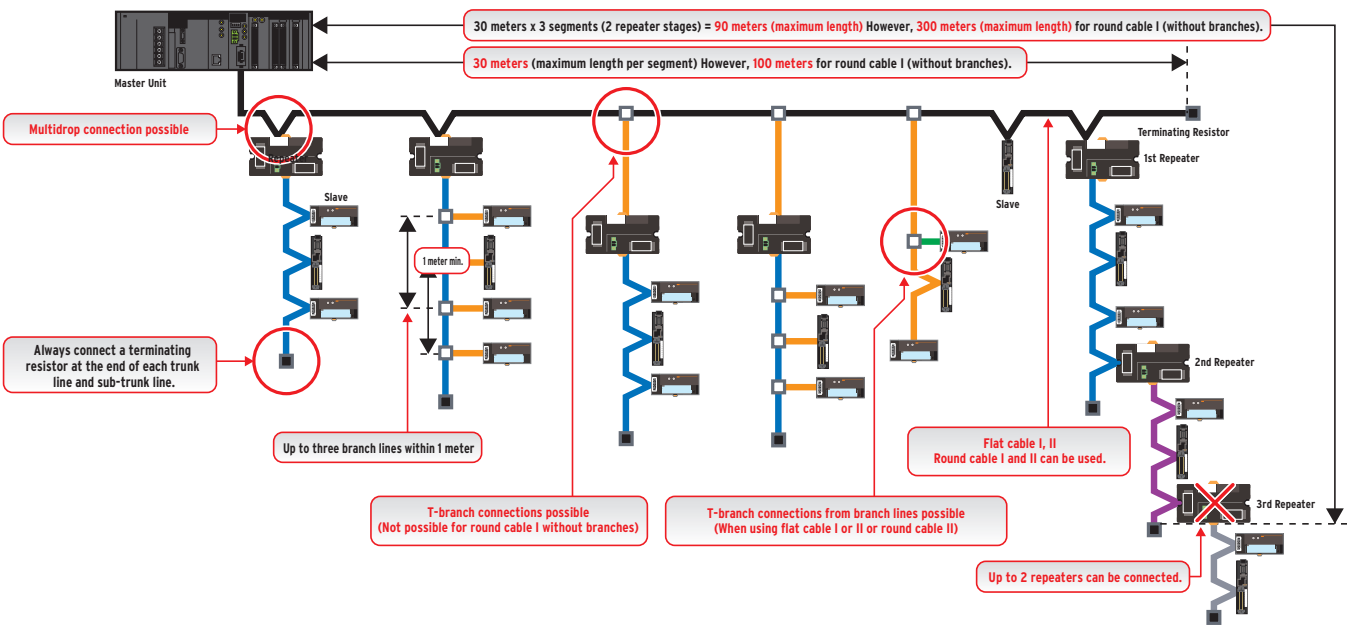


Example of wiring for 3Mbps (Application: Fast communications with branching)



Network Specifications

Example of wiring for 1.5 Mbps (Application: Balance of fast communications and branching)



Example using round cable I



The diagram illustrates a CAN bus network topology. It features a **Master Unit** at the top left, connected to a horizontal backbone. Below the backbone, several **Slave** units are connected in a hierarchical manner. On the right side of the backbone, a **Repeater Unit** is connected. The backbone terminates at both ends with **Terminating Resistors**. The network is divided into two **Range of the segment** by a dashed line, with the Repeater Unit acting as a bridge between them. The Slave units are represented by icons with labels like 'Slave' and 'Master'.

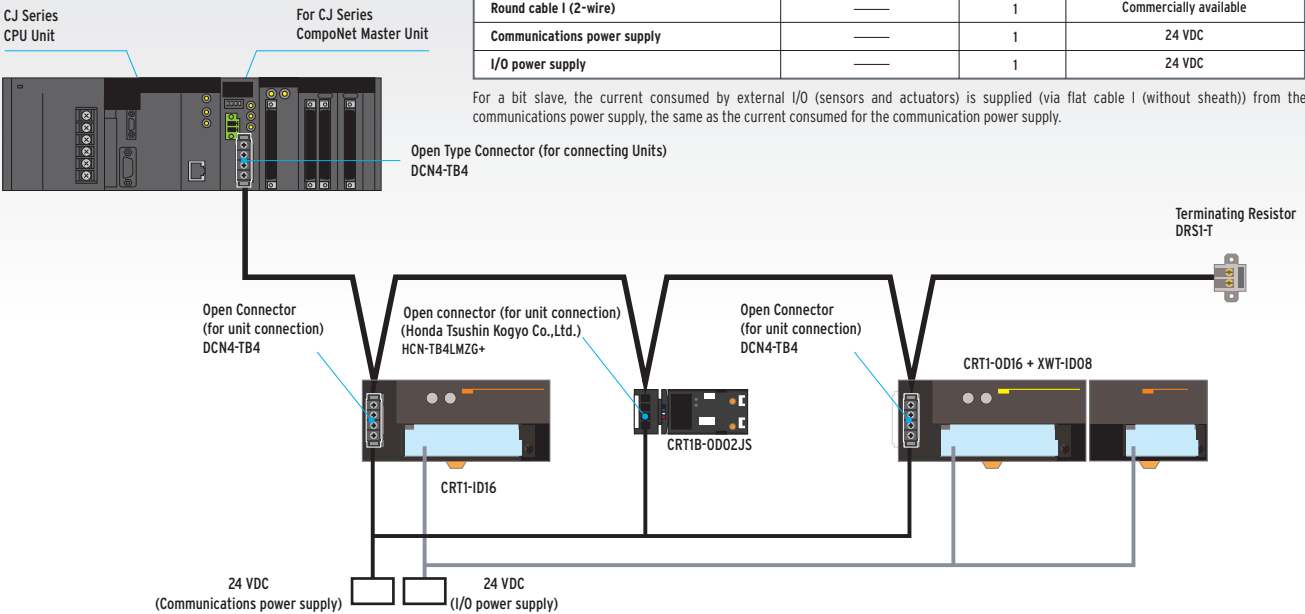
Configuration Examples and Peripheral Devices

Example with round cable I (2-wire)

Required peripheral equipment

Specification	Model	Number of units	Remarks
Open connector (for unit connection)	DCN4-TB4	3	—
Open connector (for unit connection) (Honda Tsushin Kogyo Co.,Ltd.) *1	HCN4-TBLMZG+	1	For connecting Bit Slave unit with compact connectors
Compact connector*2	—	2	—
Terminating resistor	DRSI-T	1	—
Round cable I (2-wire)	—	1	Commercially available
Communications power supply	—	1	24 VDC
I/O power supply	—	1	24 VDC

For a bit slave, the current consumed by external I/O (sensors and actuators) is supplied (via flat cable I (without sheath)) from the communications power supply, the same as the current consumed for the communication power supply.

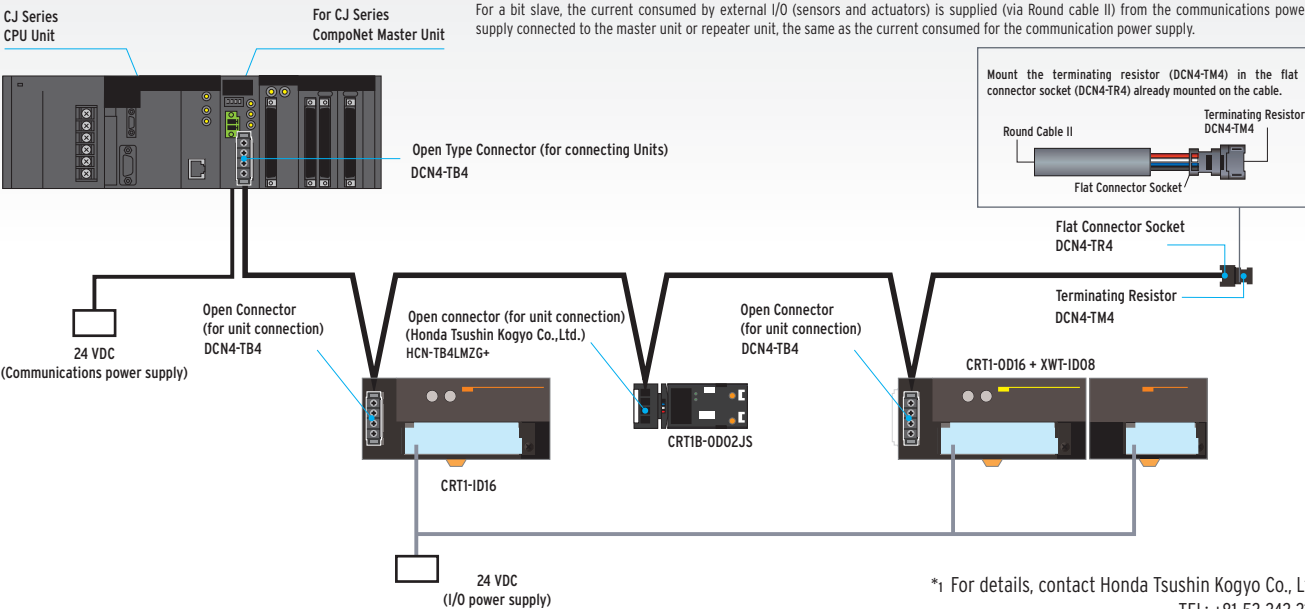


Example with round cable II (4-wire)

Required peripheral equipment

Specification	Model	Number of units	Remarks
Open connector (for unit connection)	DCN4-TB4	3	—
Open connector (for unit connection) (Honda Tsushin Kogyo Co.,Ltd.) *1	HCN4-TB4LMZG+	1	For connecting Bit Slave unit with compact connectors
Flat connector socket	DCN4-TR4	1	For terminating resistor connection
Compact connector*2	—	2	—
Terminating resistor	DCN4-TM4	1	—
Round cable (4-wire)	—	1	Commercially available
Special tool	DWT-A01	1	—
Communications power supply	—	1	24 VDC
I/O power supply	—	1	24 VDC

For a bit slave, the current consumed by external I/O (sensors and actuators) is supplied (via Round cable II) from the communications power supply connected to the master unit or repeater unit, the same as the current consumed for the communication power supply.



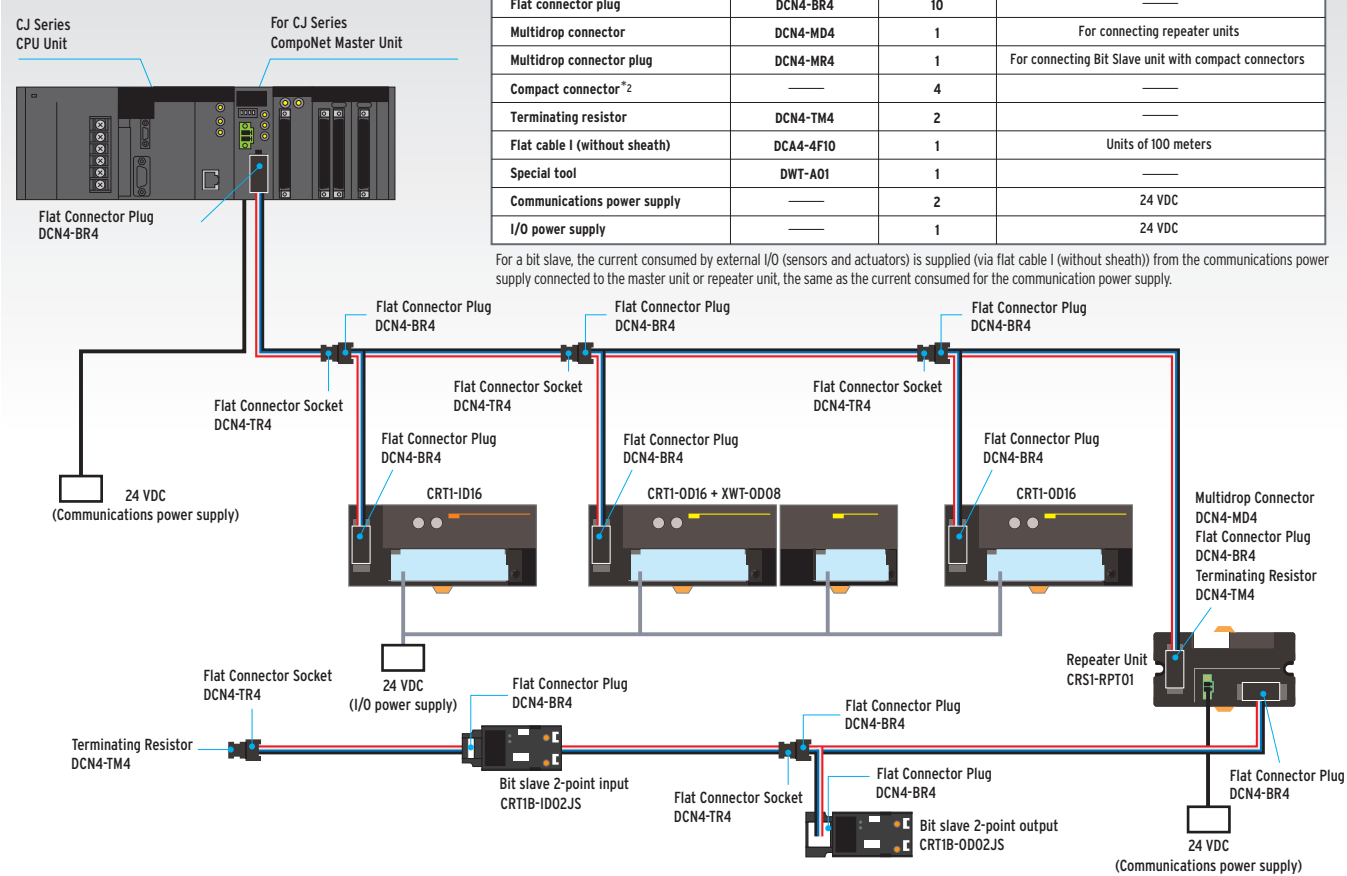
*1 For details, contact Honda Tsushin Kogyo Co., Ltd.
TEL: +81-52-242-2111

Example with flat cable I (without sheath)

Required peripheral equipment
• A computer with a minimum of 1 GB of RAM and a 1.5 GHz processor. • A Windows operating system (Windows 7 or later). • A Microsoft Office Word 2010 or later. • A Microsoft Office Excel 2010 or later. • A Microsoft Office PowerPoint 2010 or later. • A Microsoft Office Access 2010 or later. • A Microsoft Office Outlook 2010 or later. • A Microsoft Office OneNote 2010 or later. • A Microsoft Office Lync 2010 or later. • A Microsoft Office SharePoint 2010 or later. • A Microsoft Office Project 2010 or later. • A Microsoft Office Publisher 2010 or later. • A Microsoft Office Word 2010 or later. • A Microsoft Office Excel 2010 or later. • A Microsoft Office PowerPoint 2010 or later. • A Microsoft Office Access 2010 or later. • A Microsoft Office Outlook 2010 or later. • A Microsoft Office OneNote 2010 or later. • A Microsoft Office Lync 2010 or later. • A Microsoft Office SharePoint 2010 or later. • A Microsoft Office Project 2010 or later. • A Microsoft Office Publisher 2010 or later.

Specification	Model	Number of units	Remarks
Flat connector socket	DCN4-TR4	5	—
Flat connector plug	DCN4-BR4	10	—
Multidrop connector	DCN4-MD4	1	For connecting repeater units
Multidrop connector plug	DCN4-MR4	1	For connecting Bit Slave unit with compact connectors
Compact connector ²	—	4	—
Terminating resistor	DCN4-TM4	2	—
Flat cable I (without sheath)	DCA4-4F10	1	Units of 100 meters
Special tool	DWT-A01	1	—
Communications power supply	—	2	24 VDC
I/O power supply	—	1	24 VDC

For a bit slave, the current consumed by external I/O (sensors and actuators) is supplied (via flat cable I (without sheath)) from the communications power supply connected to the master unit or repeater unit, the same as the current consumed for the communication power supply.

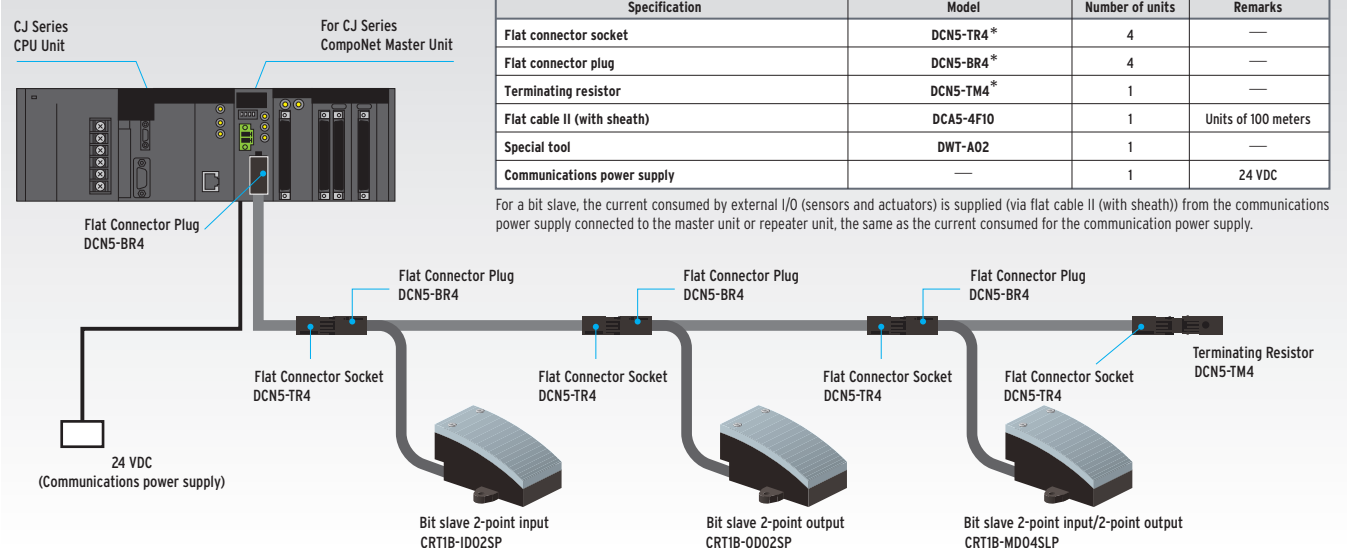


Example with flat cable II (with sheath)

	Required peripheral equipment
Computer system	PC or compatible computer with Windows operating system; minimum 80 MHz processor, 64 MB RAM, 10 MB free hard disk space, and CD-ROM drive.
Printer	Any printer capable of printing color graphics.
Internet access	Internet connection required for downloading software and updates.
Other	None.

Specification	Model	Number of units	Remarks
Flat connector socket	DCN5-TR4*	4	—
Flat connector plug	DCN5-BR4*	4	—
Terminating resistor	DCN5-TM4*	1	—
Flat cable II (with sheath)	DCA5-4FI0	1	Units of 100 meters
Special tool	DWT-A02	1	—
Communications power supply	—	1	24 VDC

For a bit slave, the current consumed by external I/O (sensors and actuators) is supplied (via flat cable II (with sheath)) from the communications power supply connected to the master unit or repeater unit, the same as the current consumed for the communication power supply.



***2 Compact Connectors**

The compact connectors use XA-series Connectors from JST Mfg. Co., Ltd.

Special cable connectors must be attached for cables connecting to external devices if a Slave Unit with Compact Connectors is used.

Name	Applicable cable range			Model	Crimping Tool
	mm ²	AWG#	Wire sheath external diameter		
Contacts	0.08 to 0.33	28 to 22	1.2 to 1.9	5XA-001T-P0.6	YC692 or YC692R
	0.22 to 0.5	24 to 20	1.5 to 1.9	5XA-01T-P0.6	YR5701 or YR5701R
Housing	—			XAP-03V-1	—

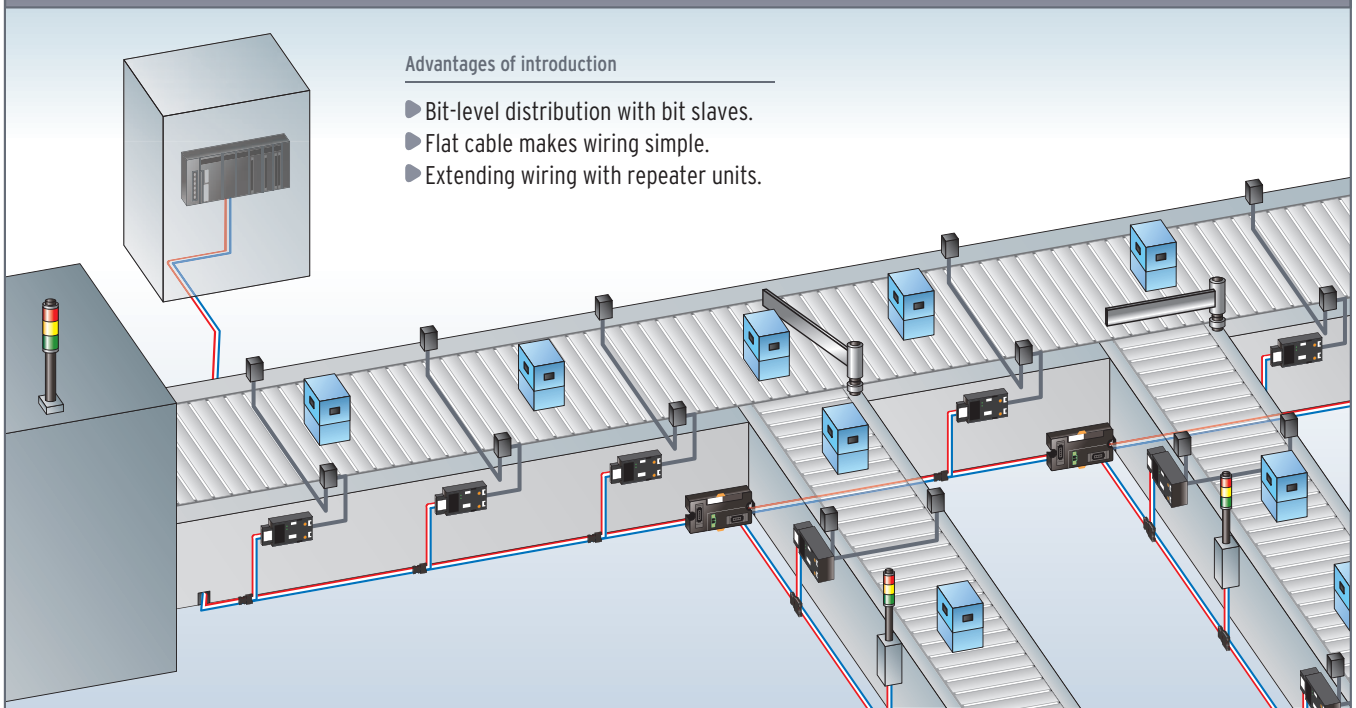
Note (1) Automated Crimp Tools are also available. For details, contact the manufacturer.

(2) For information on the processing procedure, refer to the instruction manual included with the tool or contact the manufacturer (JST Mfg. Co., Ltd.).

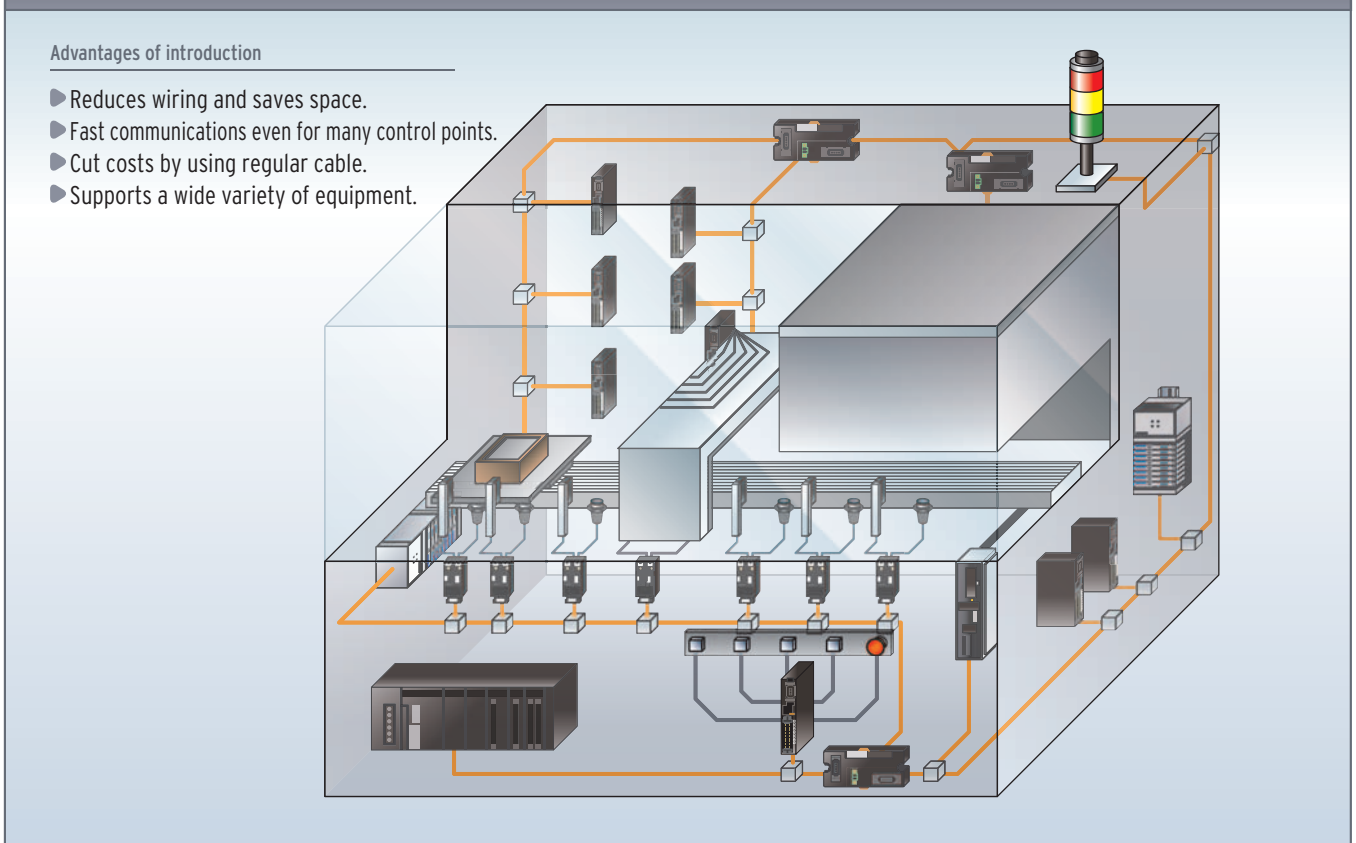
CompoNet Applications for Every Type of Manufacturing Site

These applications offer high-performance communication and superior installability that aid in reducing takt times and cutting down the work of start-up and maintenance. Customers use CompoNet in a wide variety of applications.

Transfer lines



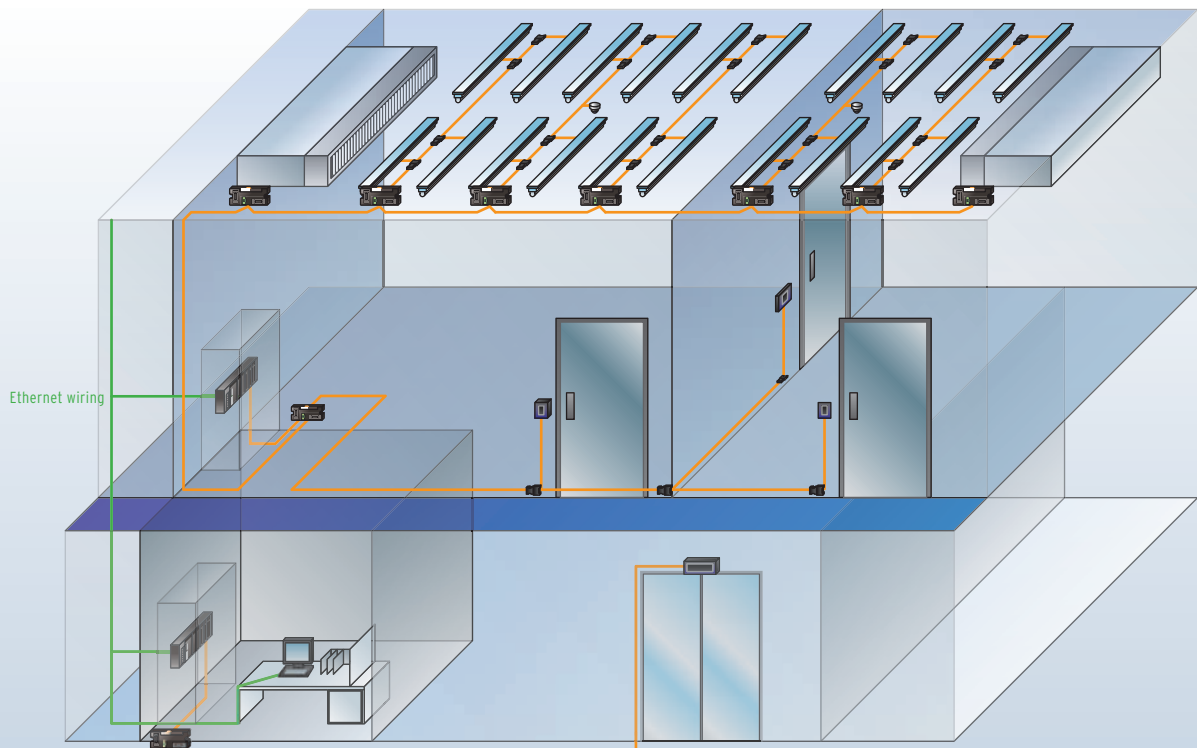
Electronic parts manufacturing device



Building automation

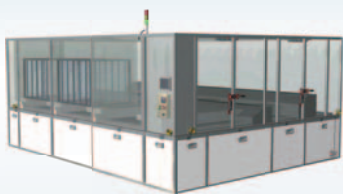
Advantages of introduction

- Wiring up to 1500 meters.
- Regular cables can be used.
- Plenty of connection capacity even for distributed installation.
- High resistance to noise.

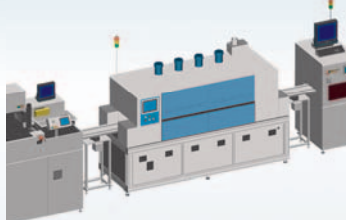


CompoNet allows high speed communications and bit-level distribution. It is usable by various applications.

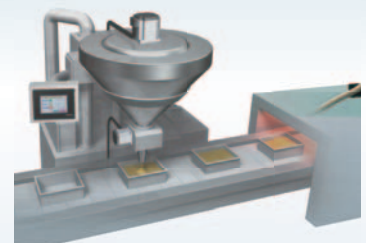
Preprocess machines for semi-conductors



Post-process machines for semi-conductors



Food processing machines



Automatic warehouse



Robots



Packaging machines



Master Units



■ CJ Series
CJ1W-CRM21



■ CS Series
CS1W-CRM21



NEW
■ Master Board
3G8F7-CRM21
3G8F8-CRM21

Digital I/O Slaves

Two-tire Screw Terminal Block



■ Input Unit
CRT1-ID08(-1)
CRT1-ID16(-1)
■ Output Unit
CRT1-OD08(-1)
CRT1-OD16(-1)
■ Input/Output Unit
CRT1-MD16(-1)

Screw-Type Terminal Block, Relay Output/SSR Output



■ Relay Outputs
CRT1-ROS08
CRT1-ROS16
■ SSR Outputs
CRT1-ROF08
CRT1-ROF16

Three-tire Screw Terminal Block



■ Input Units
CRT1-ID08TA(-1)
CRT1-ID08TAH(-1)
CRT1-ID16TA(-1)
CRT1-ID16TAH(-1)
■ Output Units
CRT1-OD08TA(-1)
CRT1-OD08TAH(-1)
CRT1-OD16TA(-1)
CRT1-OD16TAH(-1)

■ I/O Unit
CRT1-MD16TA(-1)
CRT1-MD16TAH(-1)

Horizontal Slaves with e-CON Connectors



■ Input Units
CRT1-ID16S(-1)
CRT1-ID16SH(-1)
CRT1-ID32S(-1)
CRT1-ID32SH(-1)
■ Output Units
CRT1-OD16S(-1)
CRT1-OD16SH(-1)
CRT1-OD32S(-1)
CRT1-OD32SH(-1)

■ I/O Unit
CRT1-MD16S(-1)
CRT1-MD16SH(-1)
CRT1-MD32S(-1)
CRT1-MD32SH(-1)

Vertical Slaves with e-CON Connectors



CRT1-VID08S(-1)
CRT1-VOD08S(-1)

Vertical Slaves with MIL Connectors

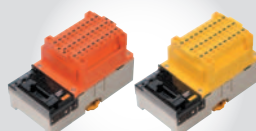


CRT1-VID16ML(-1)
CRT1-VOD16ML(-1)

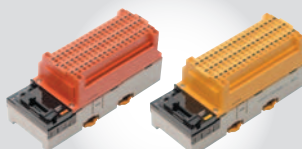


CRT1-VID32ML(-1)
CRT1-VOD32ML(-1)
CRT1-VMD32ML(-1)

Horizontal Slaves with Clamp Terminals



CRT1-ID08SL(-1)
CRT1-OD08SL(-1)



CRT1-ID16SL(-1)
CRT1-OD16SL(-1)



CRT1-MD16SL(-1)

Analog I/O Slaves

Screw Terminal Block



- Analog Input Unit
CRT1-AD04
- Analog Output Unit
CRT1-DA02

Vertical Slaves with e-CON Connectors



CRT1-VAD04S
CRT1-VDA02S

Numerical Indicator Type
CRT1-VAD02SD
CRT1-VDA02SD



Vertical Slaves with MIL Connectors



CRT1-VAD04ML
CRT1-VDA02ML

Numerical Indicator Type
CRT1-VAD02MLD
CRT1-VDA02MLD



Temperature Input Slaves



- Input Units
CRT1-TS04T
CRT1-TS04P

Expansion Units



- Input Units XWT-ID08(-1)
XWT-ID16(-1)
- Output Units XWT-OD08(-1)
XWT-OD16(-1)



- Output Units XWT-VOD08S(-1)
XWT-VOD16ML(-1)
- Input/Output Units XWT-VMD08S(-1)
XWT-VMD16ML(-1)

SmartSlice GRT1 Series

CompoNet Communications Unit



GRT1-CRT

SmartSlice I/O Units



GRT1-ID4(-1)
GRT1-OD4(-1)
GRT1-ID8(-1)
GRT1-OD8(-1)
GRT1-ROS2
GRT1-IA4-1
GRT1-IA4-2
GRT1-AD2
GRT1-DA2C
GRT1-DA2V
GRT1-TS2P
GRT1-TS2PK
GRT1-TS2T
GRT1-CT1(-1)

Compact Connector Type

Compact Connector Type



NEW

- Input Unit
CRT1B-ID02JS(-1)
- Output Unit
CRT1B-OD02JS(-1)
- Input/Output Unit
CRT1B-MD02JS(-1)



NEW

- Input Unit
CRT1B-ID04JS(-1)
- Output Unit
CRT1B-OD04JS(-1)
- Input/Output Unit
CRT1B-MD04JS(-1)

e-CON Connector Type

e-CON Connector Type



- Input Unit (IP20 compliant)
CRT1B-ID02S(-1)
- Output Unit (IP20 compliant)
CRT1B-OD02S(-1)



- Input Unit (IP54 compliant)
CRT1B-ID02SP(-1)
CRT1B-ID04SP(-1)
- Output Unit (IP54 compliant)
CRT1B-OD02SP(-1)

Clamp Type

Clamp Type



- Input/Output Unit (IP54 compliant)
CRT1B-MD04SLP(-1)

Repeater Unit



CRS1-RPT01

Sensor Communications Unit



ZS-CRT

The CompoNet network lets you connect to units and branch and extend cables by just mounting connectors on communications cables and units. The cable connection and branching methods depend on the cable type and branching form.

- Four types of cable can be used on CompoNet networks.
- Round cable I (2-wire), commercially available

● Round cable II (4-wire), commercially available

● Flat cable I (without sheath) DCA4-4F10

● Flat cable II (with sheath) DCA5-4F10
- The terminating resistors, connectors, and special tools depend on the cable type.

Cable type	Unit connection and branching connector		Terminating resistor	Tool
Round Cable I (2-wire) Commercially available	■ Open Type Connector (For connecting Units) DCN4-TB4 *1	■ Open Type Connector (For connecting Units) HCN4-TBLMZG+ (Honda Tsushin Kogyo Co.,Ltd.)	■ Terminating Resistor DRS1-T	
Round Cable II (4-wire) Commercially available	■ Open Type Connector (For connecting Units) DCN4-TB4 *1	■ Open Type Connector (For connecting Units) HCN4-TBLMZG+ (Honda Tsushin Kogyo Co.,Ltd.)	■ Terminating Resistor DCN4-TM4 ■ Flat Connector Socket DCN4-TR4 Mount the terminating resistor (DCN4-TM4) in the flat connector socket (DCN4-TR4) already mounted on the cable.	■ Special Tool For flat cable I (without sheath) DWT-A01
Flat Cable I (without sheath) DCA4-4F10	■ Flat Connector Socket DCN4-TR4 ■ Multidrop Connector DCN4-MD4 *2	■ Flat Connector Plug DCN4-BR4 ■ Multidrop Connector Plug DCN4-MR4 *2	■ Terminating Resistor DCN4-TM4	■ Special Tool For flat cable I (without sheath) DWT-A01
Flat Cable II (with sheath) DCA5-4F10	■ Flat Connector Socket DCN5-TR4	■ Flat Connector Plug DCN5-BR4	■ Terminating Resistor DCN5-TM4	■ Special Tool For flat cable II (with sheath) DWT-A02

*1 Open Type Connectors (DCN4-TB4) are not connectable with Bit Slave Units whose connectors are small. Use connectors made by Honda Tsushin Kogyo instead.

*2 Multidrop Connectors (DCN4-MD4) are not connectable with Bit Slave Units with Compact Connectors. Use Multidrop Connector Plugs (DCN4-MR4) instead.

Compact Connectors

The compact connectors use XA-series Connectors from JST Mfg. Co., Ltd. Special cable connectors must be attached for cables connecting to external devices if a Slave Unit with Compact Connectors is used.

Name	Applicable cable range			Model	Crimping Tool
	mm ²	AWG#	Wire sheath external diameter		
Contacts	0.08 to 0.33	28 to 22	1.2 to 1.9	5XA-001T-P0.6	YC692 or YC692R
	0.22 to 0.5	24 to 20	1.5 to 1.9	5XA-01T-P0.6	YR5701 or YR5701R
Housing	—			XAP-03V-1	—

Note (1) Automated Crimp Tools are also available. For details, contact the manufacturer.

(2) For information on the processing procedure, refer to the instruction manual included with the tool or contact the manufacturer (JST Mfg. Co., Ltd.).

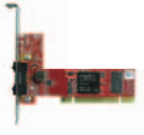
Comparison of Specifications with DeviceNet

Reference data

This table compares CompoNet and DeviceNet specifications.
Select the one that matches your applications and uses.

		
Features	Bit-level distribution High speed, multiple nodes, superior branching, low cost	High-capacity I/O data communication for multiple points and multiple channels
Maximum baud rate	4 Mbps (1024 points/1 ms)	500 kbps (1024 points/12.6 ms *)
Communication medium	■ Round cable I (2-wire) ■ Round cable II (4-wire) ■ Special flat cable I (4-wire, without sheath) ■ Special flat cable II (4-wire, with sheath)	■ Special thick cable (5-wire) ■ Special thin cable (5-wire) ■ Special flat cable (4-wire)
Maximum communication distance	1500 m (for 93.75 kbps with repeaters and round cable I)	500 m (for 125 kbps with special thick 5-wire cable)
Maximum number of nodes connected	■ Word slave unit: 64 input units/64 output units ■ Bit slave unit: 128 input units/128 output units ■ Repeater unit: 64 units	64 units (including master, slaves and configurator)
Maximum number of I/O points	■ Word slave unit: inputs and 1024 outputs (2048 I/O points total) ■ Bit slave unit: inputs and 256 outputs (512 I/O points total)	32000 points (When using CS1W-DRM21-V1/CJ1W-DRM21)
Safety support	None	Yes (DeviceNet Safety)

* This chart reflects the theoretical values for the CJ1 series master unit so refer to them as approximated values.

Master	YASKAWA ELECTRIC CORPORATION  +81-4-2962-5823  www.e-mechatronics.com		265IF-01(CompoNet Master Communication Module) [JAPMC-CM2390-E]	► Features 1. 265IF-01 can be connected to the abundant slave group as a CompoNet master. 2. 265IF-01 is attached to the optional slot of the MP2000 series controller.	Coming soon
	Hilscher GmbH  Europe Hilscher GmbH (Germany) Tel: +49-(0)-6190-9907-0 North America Hilscher North America, Inc. (USA) Tel: +1-630-505-5301 Asia-Pacific Hilscher GmbH (Germany) Tel: +49-(0)-6190-9907-0 China Hilscher GmbH (Shanghai Rep. Office) Tel: +86-(0)-21-6355-5161 India Tel: +91-(0)-11-4051-5640  info@hilscher.com Overseas sales areas: Europe, North America, Asia-Pacific, China, Other		CompoNet Slave PCI card [CIFX 50-CPS]	► Features 1. Data exchange via Dual Port Memory as host I/F 2. Driver for Windows and other type of RTOS on request 3. Plan for PCI Express card and other PC form factors	Coming soon
Slave	YASKAWA ELECTRIC CORPORATION  +81-930-25-2548  www.e-mechatronics.com Overseas sales areas: Europe YASKAWA ELECTRIC EUROPE GmbH Tel:+49-6196-569-300 North America YASKAWA ELECTRIC AMERICA, INC. Tel:+1-847-887-7000 Asia-Pacific YASKAWA ELECTRIC KOREA CORPORATION Tel:+82-2-784-7844 YASKAWA ELECTRIC (SINGAPORE) PTE.LTD. Tel:+65-6282-3003 China YASKAWA ELECTRIC (SHANGHAI) CO.,LTD. +86-21-5385-2200		YASKAWA AC Drive V1000 [CIMR-Vxxxxxxx]	► Features 1. Synchronous motor capability more compact, greater energy savings 2. Powerful functions for quick installation, easy maintenance 3. Compliance with EU's RoHS standard. Shock-proof, moisture-resistant, and other models also available.	Coming soon
	YASKAWA ELECTRIC CORPORATION  +81-930-25-2548  www.e-mechatronics.com Overseas sales areas: Europe YASKAWA ELECTRIC EUROPE GmbH Tel:+49-6196-569-300 North America YASKAWA ELECTRIC AMERICA, INC. Tel:+1-847-887-7000 Asia-Pacific YASKAWA ELECTRIC KOREA CORPORATION Tel:+82-2-784-7844 YASKAWA ELECTRIC (SINGAPORE) PTE.LTD. Tel:+65-6282-3003 China YASKAWA ELECTRIC (SHANGHAI) CO.,LTD. +86-21-5385-2200		YASKAWA AC Drive V1000 [CIMR-Vxxxxxxx]	► Features 1. Synchronous motor capability more compact, greater energy savings 2. Powerful functions for quick installation, easy maintenance 3. Compliance with EU's RoHS standard. Shock-proof, moisture-resistant, and other models also available.	Coming soon
Inverter	SMC CORPORATION  +81-3-5207-8249  www.smcworld.com Overseas sales areas: Europe, North America, Asia-Pacific, China		Fieldbus System Compatible with CompoNet™ [EX120/121/122 Series]	► Features 1. Output type : Compatible with NPN(+COM.) / PNP(-COM.) 2. Applicable Solenoid Valve Series : SY,SVQV Series 3. Low Power Consumption : SY Series also available with a power saving 0.1W circuit.	Coming soon
	CKD CORPORATION  Europe TEL:+81-(0)568-74-1303 North America TEL:+81-(0)568-74-1303 Asia-Pacific TEL:+81-(0)568-74-1303 China TEL:+81-(0)568-74-1303  www.ckd.co.jp/english Overseas sales areas: Europe, North America, Asia-Pacific, China, Other		Pilot type 3-5 ports pilot valve [46 series]	► Features 1. Very long life: more than 60 million times due to elastic seal with few air leakage. 2. Enhanced safety function: Manual override button with protective cover and integrated check valve preventing back pressure.	Coming soon
Solenoid Valves	Koganei Corporation  +81-42-383-7271  www.koganei.co.jp Overseas sales areas: Europe, North America, Asia-Pacific		CompoNet-compatible Solenoid Valves [JA Series] ► Features 1. Thin and Compact: Valve width of only 10 mm with effective area of 3.5 mm ² . 2. Lower power consumption. Standard: 0.5 W Low current type: 0.25 W 3. Two 3-port valves in one body.		CompoNet-compatible Solenoid Valves [F Series] ► Features 1. Single/double dual-use valves. 2. Three of valve widths: 10, 15 and 18 mm 3. Uses dual-use fittings for different tube sizes.
	Koganei Corporation  +81-42-383-7271  www.koganei.co.jp Overseas sales areas: Europe, North America, Asia-Pacific		CompoNet-compatible Solenoid Valves [JA Series] ► Features 1. Thin and Compact: Valve width of only 10 mm with effective area of 3.5 mm ² . 2. Lower power consumption. Standard: 0.5 W Low current type: 0.25 W 3. Two 3-port valves in one body.		CompoNet-compatible Solenoid Valves [F Series] ► Features 1. Single/double dual-use valves. 2. Three of valve widths: 10, 15 and 18 mm 3. Uses dual-use fittings for different tube sizes.
Controllers and Signal Towers	IAI Corporation  www.intelligentactuator.com/ Overseas sales areas: Europe, North America, Asia-Pacific, China		Controller for RCA/RCA2 Series ROBO CYLINDER [ACON-C/C6] ► Features 1. Designed for 24 VDC servomotors. 2. Multipoint positioning: up to 512 points. 3. High speed: Up to 800 mm/s.		Controller for RCP2/RCP3 Series ROBO CYLINDER [PCON-C/C6] ► Features 1. Designed for 24 VDC pulse motors. 2. Multipoint positioning: up to 512 points. 3. High power in lower speed range.
	PATLITE Corporation  +81-6-6763-8220  www.patlite.com Overseas sales areas: Europe, North America, Asia-Pacific, China		CompoNet Supported Signal Tower [LE-K3(B)P/W-RYG] ► Features 1. Use of ultra-bright LED enhanced for illumination. 2. Two selectable sound patterns with adjustable volume.		CompoNet Supported Wall-Mount Signal Tower [WEP-K3(B)-RYG] ► Features 1. A 37.5 mm-thin design that significantly enhances integration with equipment as a built-in signal system. 2. Clear vertical cut lens enhanced for illumination over a wide perspective. 3. Built-in audible alarm.

JSK CO., LTD.

+81-72-661-4071
www.nihon-seigyo.co.jp



CompoNet-RS422/485 Converter
[DWPC-001]

► Features

1. Connects conventional RS422/485 control devices to CompoNet.
2. Programmable RS422/485 interface realizes easy software implementation.
3. DeviceNet, CC-Link, other protocols are coming soon.

Under development

AIOI-SYSTEMS CO.,LTD.

+81-3-3764-0228
www.hello-aioi.com/en
info@hello-aioi.com

Overseas sales areas:
Europe, North America,
Asia-Pacific, China Other



Gateway Controller for CompoNet
[TW2118]

► Features

1. AI-NET-Componet Gateway Controller.
2. Maximum coDrop Light Modules Number is 64.

Coming soon

Honda-connectors

+81-52-242-2111
www.honda-connectors.co.jp

Overseas sales areas:
Europe, North America, China,
Asia-Pacific, Southeast Asia



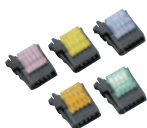
Connector
[HCN-(S)4(X)JFD6 +]
[HCN-TB 4LMZG +]

► Features

1. PCB SIDE
 - Smaller than conventional product
 - Mating area of SLIM TYPE is 8mm, compared with 10mm of conventional product.
2. CABLE SIDE
 - INSIDE HOOK(LOCK SYSTEM INSIDE CASE)
 - Possible to lead cables to 2 directions out.

Tayco Electronics AMP K.K

+81-44-844-8080
www.tycoelectronics.com



RITS Connector (e-CON)
[X-1473562-4]

► Features

1. New Chisel Press Contacts for sensor cables.
2. No special crimping tool required for easy termination.
3. Two contact points for good connection and more security.

3M Company

www.3M.com/interconnects



Mini-Clamp Connector:
[3710x-xxxx-000 FL]

► Features

1. IDC technology reduces process/cost of wire termination.
2. Crimped using standard pliers to reduce tool costs.
3. Design offers multiple gauges and wire size diameters.

HARTING

+81-45-476-3456
www.harting.co.jp/
jp@HARTING.com

Overseas sales areas:
Europe, North America, China,
Asia-Pacific



HARAX M12-L
[2103 212 1305]
[2103 212 2305]

► Features

1. No special tool required
2. terminate up to 0.75mm2wire
3. IP67 degree of protection(DIN EN60 529,IEC 60 529)

SWCC SHOWA CABLE SYSTEMS CO., LTD.

+81-3-3597-7117
www.swcc.co.jp



CompoNet Cable

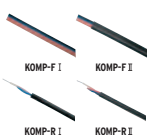
► Features

- TCN-R1 Round Cable 19AWGx2C(CL3,CM,cUL-CM,75°C)
TCN-R2 Round Cable 19AWGx4C(CL3,CM,cUL-CM,75°C)
TCN-F1 Flat Cable 21AWGx2C+19AWGx2C
TCN-F2 Flat Cable 21AWGx2C+19AWGx2C

Coming soon

KURAMO ELECTRIC CO.,LTD.

+81-778-22-1500
www.kuramo.co.jp



CompoNet Flat Cable I, II
CompoNet Round Cable I, II
① CompoNet Flat Cable KOMP-F I 21AWG x 2, 19AWG x 2
② CompoNet Flat Cable KOMP-F II 21AWG x 2, 19AWG x 2
③ CompoNet Round Cable KOMP-R I 19AWG x 2
④ CompoNet Round Cable KOMP-R II 19AWG x 4

► Features

1. CompoNet Flat Cable KOMP-F I
Heat resistance:90 Flame resistance:FT4
UL certification:UL13 CL2 CSA certification:CSA C22.2 No.210
2. CompoNet Flat Cable KOMP-F II
Oil resistance-Heat resistance:90
Flame resistance:UL FLAME EXPOSURE UL certification:UL13 PLTC,UL444 CM
CSA certification:CSA C22.2 No.214
3. CompoNet Round Cable KOMP-R I
CompoNet Round Cable KOMP-R II
Oil resistance Heat resistance:90
Flame resistance:FT4 UL certification:UL13 PLTC,UL444 CM

NICHIGOH COMMUNICATION ELECTRIC WIRE CO.,LTD

+81-72-923-5104
www.nichigoh.co.jp



UNICOMPO series
-CompoNet Flat type cable (Sheath less):UNICOMPO FC I-T
-CompoNet Flat type cable (With Sheath):UNICOMPO FC II-T
-CompoNet Round type cable (2c):UNICOMPO RC I-T
-CompoNet Round type cable (4c):UNICOMPO RC II-T

► Features

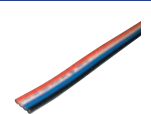
1. Conformity to UL/cUL standard(CM,CL2)
2. Conformity to NFPA79,NFPA70(NEC)
3. The RC type acquires CE, and is acquiring the FC type

Kanetsu Co.,Ltd

+81-75-662-0996
www.kanetuu.co.jp/
info_kanetsu@kanetuu.co.jp

Overseas sales areas:
Europe, North America, China,
Asia-Pacific, Taiwan, Vietnam

CompoNet Flat Cable I and II



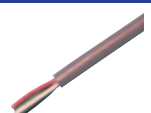
Daiko. E.W.
[KCNF]
► Features
1. Enables using unique isolation-displacement connectors for CompoNet.
2. Easy one-step IDC connection without insulation stripping.
3. UL AWM, CSA compliant.

Oil-resistant and Highly Flexible Round Cable II for CompoNet



Hanshin Electric Wire & Cable Co., Ltd.
[MRC-4]
► Features
1. The cable can be used for mobile and oil-resistant wiring.
2. Round cable for low cost installation.
3. UL AWM, CSA compliant.

CompoNet Round Cable I and II



Onamba Co., Ltd
[VCTF-2C VCTF-4C]
► Features
Round cable for low cost installation.

Taiyo Electric Wire & Cable Co., Ltd.

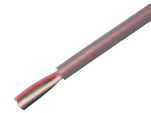
[KCNF-J]

► Features

1. Enables using unique isolation-displacement connectors for CompoNet.
2. PVC jackets with polarity guide line for IP54 system.
3. Easy one-step IDC connection without insulation stripping.
4. UL AWM, CSA compliant



Kawai Cable, Ltd.
[VCTF-2C VCTF-4C]
► Features
Round cable for low cost installation.



OMRON Corporation

✉ open_integration@omron.co.jp

MPU for CompoNet Slave, MPU for CompoNet Master

► Features

Slave: Omron offers the development approach of three types by the function of the slave.

1. Few-Point Slave
 - I/O Size: Digital I/O in MAX 32 points
 - Application interface: Via I/O port
2. Multi-Points Slave
 - I/O size: Outputs: 0 to 256 points (32 bytes)
 - Inputs: 0 to 256 points (32 bytes)
 - Application interface: DPRAM
3. Protocol stack
 - No restriction in MPU and OS

Master: Omron offers two kinds of development approaches.

1. DP-RAM/F MPU
 - Development is unnecessary of the communication protocol.
 - The communication protocol including RAS is mounted on MPU.
2. Library
 - System Call I/F of ITRON

OMRON Corporation

www.omron.com/

Overseas sales areas:
Asia-Pacific,



On board Connector

[XW7D-PB4-SI][XW7D-PB4-RJ][XW7D-PB4-L]

► Features

1. 3 type models are ready to correspond with some applications.
2. Enable to mate DCN4-MD4/DCN4-TB4 with lock lever.
3. UL approved.

HMS INDUSTRIAL NETWORKS Co.,Ltd

Europe
Tel: +46-35-172900
North America
Tel: +1-312-829-0601
China
Tel: +86-10-8532-3183

✉ Europe
info@hms.se
USA
us-sales@hms-networks.com
CHINA
cn-sales@hms-networks.com

Overseas sales areas:
Europe, North America, Asia-Pacific,
China



Anybus CompactCom Componet

[ABCC-CPN]

► Features

1. Embedded solutions of CompoNet slave for device vendors.
2. Can release the device for CompoNet with short term.
3. Common interface with DeviceNet and EtherNet/IP.

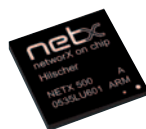
Release: February / 2010

Hilscher GmbH

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China
Hilscher GmbH (Shanghai Rep. Office)
Tel: +86-(0)-21-6355-5161
India
Tel: +91-(0)-11-4051-5640

✉ info@hilscher.com

Overseas sales areas:
Europe, North America, Asia-Pacific,
China, Other



CompoNet Communication Controller

[netX 50 / netX 100 / netX 500]

► Features

1. CompoNet, DeviceNet, EtherNet/IP and various Fieldbus / Real Time Ethernet on one chip
2. Control by external CPU via DPM or Application can be implemented on the internal ARM (200MHz)
3. UART / USB / SPI / I2C / GPIO / LCD controller / ADC / PWM / DMA / CCD (depends on chip type)

NSD Co., Ltd.

✉ +81-3-3342-1380
www.nsd.co.jp/english/
✉ ia-info@nsd.co.jp

Overseas sales areas:
North America

CompoNet Master Stack Tool Kit (C-MTK)

[CMK-100]

► Features

1. A developers' tool kit to implement communication function for CompoNet master modules
2. CompoNet master protocol stack firmware example source codes and various kinds of technical items are included
3. Software development and its technical services can be provided, if a industrial device vendor would like to develop CompoNet devices.

CompoNet Slave Stack Tool Kit (C-SSC)

[CSS-200]

► Features

1. A developers' tool kit to implement communication function for CompoNet slave modules.
2. CompoNet slave protocol stack firmware example source codes and various kinds of technical items are included.
3. Software development and its technical services can be provided, if a industrial device vendor would like to develop CompoNet devices.

Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. **Prices; Payment Terms.** All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. **Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. **Orders.** Omron will accept no order less than \$200 net billing.
6. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. **Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
 - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
 - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 - d. Delivery and shipping dates are estimates only; and
 - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. **Warranties.** (a) **Exclusive Warranty.** Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) **Limitations.** OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) **Buyer Remedy.** Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See <http://www.omron247.com> or contact your Omron representative for published information.
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17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
18. **Miscellaneous.** (a) **Waiver.** No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) **Assignment.** Buyer may not assign its rights hereunder without Omron's written consent. (c) **Law.** These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) **Amendment.** These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) **Definitions.** As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. **Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
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 - (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
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