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QMS 002

Fuji Electric

Innovating Energy Technology

Edition 5

AUTOMATION CATALOG

Your Partner in Factory Solutions

DRIVE & INDUSTRIAL AUTOMATION DIVISION

บริษัท เอส. ที. คอนโทรล จำกัด

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ISO 9001 QMS 17014/1639

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QMS 002

ได้รับการรับรองมาตรฐาน ISO 9001:2015

จาก Management System Certification Institute (Thailand) : MASCI

การให้บริการอย่างมีมาตรฐานถือเป็นหัวใจหนึ่งของ **บริษัท เอส.ที. คอนโทรล จำกัด** เพื่อความเป็นระบบบริหารงานคุณภาพตามมาตรฐานสากล (Quality Management System) ในทุกส่วนงานบริการ บริษัทฯ ได้ผ่านการรับรองระบบมาตรฐาน ISO 9001:2015 จาก สถาบันรับรองมาตรฐานไอเอสโอ (สรอ.) (MASCI) เป็นที่เรียบร้อย และยังคงมีการประเมินทุกๆ ปีอย่างต่อเนื่อง

บริษัท เอส. ที. คอนโทรล จำกัด
S.T. Control Co.,Ltd.

MASCI
สถาบันรับรองมาตรฐานไอเอสโอ
Management System Certification Institute (Thailand)

S.T. Control Co., Ltd. was established by Mr.Siri Prakritipong in 1996 inspired by the idea to create a dynamic system for Industrial / Factory automation to support the OEM, Machine makers & manufacturing sector to increase the quality of automatic machinery in the industry. Over 2 decade passed by, S.T. Control Co., Ltd. has divided their business into 3 pillars sectors, Engineering Design, Trading, and as Turnkey Contractors accordingly.

From the ongoing experience of past 20 years, of designing and installation services of automation control systems, S.T. Control Co., Ltd. has become a leader in Factory Automation, S.T. Control Co., Ltd. helps the industry enter the era of the Industry 4.0 and make your organization grows fast and secure.

Our Mission

To Society

Giving society with best in class Technology for Energy saving and Enabling Environmental friendly.

To Customers

Providing good quality and best in class Technology products for reducing of Production cost, deliver good quality control as well as minimizing production cycle time.

Our Competence

Engineer teams is experienced in Engineering work, Installation for several Industrial application.

Our Repair drive and calibrator Lab are welltrained from Fuji Electrical Japan and prompt to provide after sales services and calibration work to clients.

About Energy saving management, our professional Engineers team will provide knowledge for promoting Energy saving methodology as solution providers to customers.

Certificate of Repair Service

This is to certify that

S.T.CONTROL CO.,LTD.

has given permission to repair on following Fuji Inverter series.

FRN-G11S Series (below 220[kW])
FRN-P11S Series (below 220[kW])
FRN-VG7S Series (below 220[kW])
FALDIC-α Series
FALDIC-W Series

Fuji Electric Systems Co.,Ltd

Distributorship Certificate

Fuji Electric FA Singapore
proudly appoints
ST ADVANCED TECHNOLOGY CO., LTD
S.T. CONTROL CO.LTD
as an Authorized Distributor
for
Fuji Electric Low Voltage AC Drive System Products

Dated 1st of January 2005

Yoshinori Ichimura
Managing Director
Fuji Electric FA Singapore Private Ltd

ศูนย์บริการแห่งเดียวในประเทศไทย ที่ได้รับการรับรองจาก ฟูจิ อิเลคทริค ประเทศญี่ปุ่น

Integrated
Automation Solution

DRIVE & INDUSTRIAL AUTOMATION DIVISION

As the market leader in Automation Solution Providers, in-depth process expertise and technological experience, we implement integrated and economical automation solutions with “Fuji Electric”, Japan Automation & Drives product precisely tailored, end-to-end solution to your individual specific requirements.

In the dynamic world of automation, inverters from Fuji Electric FA are reliable components that offer security and have impressive properties.

A high quality standard during design, together with robust technology, is a guarantee for fault-free and long operating lives. The average MTBF time is 860,000 hours!

The well-developed modular design enables cost-optimising adaptation of the inverter and options to the corresponding requirements.

World-leading technologies developed to help alleviate global warming

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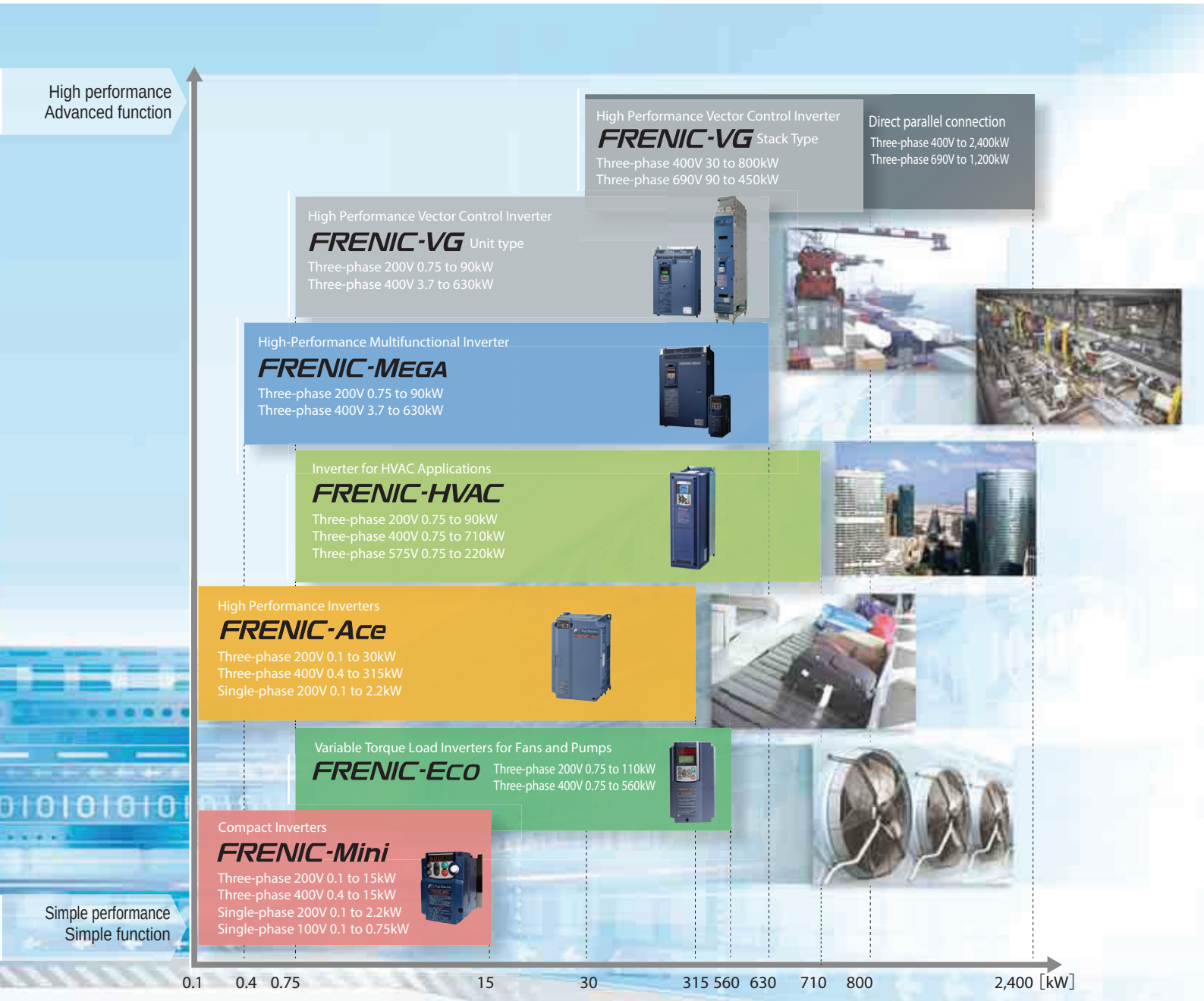
Fuji Inverter Family Consisting of a Diverse Lineup

Major features of Fuji inverters

- Environmentally-friendly long-life design (10 years) and compliance with RoHS directive *1
- A wide variety from simple performance models to high performance models
- Specialized models lined up that can maximize the performance for each application such as fan and pump application and crane application

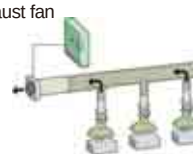
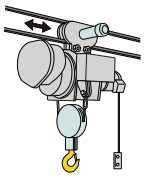
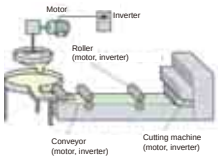
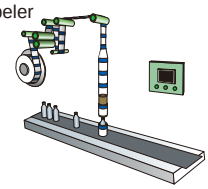
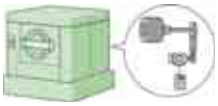
*1 Except for some models.

Fuji inverter series lineup



Diversifying Fuji inverter applications

◎ : Best suitable ○ : Suitable

Classification	Representative instrument image	Application example	FRENIC-Mini	FRENIC-Eco	FRENIC-Ace	FRENIC-HVAC	FRENIC-MEGA	FRENIC-VG
Fluid machine	Exhaust fan 	Fan	○	◎	○	◎	◎	
		Pump	○	◎	○	◎	◎	
		Blower	○	◎	○	◎	◎	
		Compressor	○	◎	○	◎	◎	
		Gear pump			○		◎	
Machine tool	Drilling machine	Drilling machine			○		◎	
		Turning machine			○		◎	
		Grinding machine			○		◎	
		Tool changer	○		◎			
		Milling machine					○	◎
		Machining centre					○	◎
Metal processing machine	Pressing machine	Pressing machine					○	◎
		Winder					○	◎
		Wire drawing machine			○			◎
		Shearing machine			○			◎
		Dicer						◎
Conveyor machine (vertical)	Hoist crane 	Elevator			○		○	◎
		Escalator			○		○	◎
		Multi-level storage			○		○	◎
		Multi-level parking lot			○		○	◎
		Crane					○	◎
		Hoist crane			◎		○	◎
Conveyor machine (horizontal)	Conveyor	Conveyor transport	○		◎		◎	
		Chain transport	○		◎		◎	
		Ball screw	○		◎		◎	
Food processing machine	Noodle making machine 	Noodle making machine	○		◎		◎	
		Confectionery machine	○		◎		◎	
		Tea making machine	○		◎		◎	
		Bread making machine	○		◎		◎	
		Mixer	○		◎		◎	
		Slicer	○		◎		◎	◎
Packing and bookbinding machine	Labeler 	Labeler	○		○		◎	◎
		Inner packing machine	○		○		◎	◎
		Outer packing machine	○		○		◎	◎
		Bookbinding machine	○		○		◎	◎
		Wrapping machine	○		○		◎	◎
		Paper machine	○		○		◎	◎
Printing machine	Printing machine	Winder			○		○	◎
		Slitter					○	◎
		Offset printing machine					○	◎
		Rotary printing machine					○	◎
Health, medical, welfare care instruments	Treadmill	Stair lift	○		◎			
		Treadmill	○		◎			
		Care bed	○		◎			
		Bubble bath	○	○	◎	○		
Others	Commercial laundry machine 	Commercial laundry machine	○		○		◎	
		Car washing machine	◎		○			
		Food waste disposer	◎		○			
		Conveyor-belt sushi	◎		○			
		Stage installation			○			◎
		Pachinko ball feeder	◎		○		◎	

* Options may be required for application.

Special option

Applicable inverter			FRENIC-Mini	FRENIC-Eco	FRENIC-Ace	FRENIC-HVAC	FRENIC-MEGA	FRENIC-VG
Item	Control option card	Relay Output Interface Card		○		○	○	
		Digital Interface Card			○		○	○
		Analog Interface Card			○	○	○	○
		PG Interface Card			○		○	○
		Analog Current Output Interface Card				○	○	
		Synchronize Interface Card						○
	Communication option card	RS-485 Communications Card	Built-in	○	Built-in*1	Built-in	Built-in	Built-in
		T-Link Communications Card					○	○
		SX-bus Communications Card					○	○
		E-SX-bus Communications Card						○
		PROFIBUS-DP Communications Card		○	○	○	○	○
		DeviceNet Communications Card		○	○	○	○	○
		CANopen Communications Card			○	○	○	
		CC-Link Communications Card		○	○	○	○	○
		LonWorks Communications Card		○		○		
		Ethernet Communications Card			○			
		Resistance Temperature Detector Input Card		○		○		
		ProfiNet-RT Communications Card			○			
		ProfiNet-IRT Communications Card						○
		User Programming Card (UPAC)						○
		Functional Safety Card						○
	Software	Inverter support loader software	○	○	○	○	○	○
	Operation option	Remote touch panel	○	Standard	Standard			
		Remote touch panel with USB	○		○		Standard	
		Multifunctional touch panel		○	○	Standard	○	Standard

*1 The number of connectors of the RS-485 port can be changed from 1 to 2 by mounting an option card.

Fuji Inverter Family Contributing with a Diverse Lineup

Standard Standard product Semi-standard Semi-standard product

Compact Inverters

FRENIC-Mini

RoHS

- Series of compact inverters equipped with functions ideal for diverse small capacity needs
- Frequency setting volume control provided as standard equipment, allowing easy operation
- Dynamic torque-vector control, PDI control function, cooling fan ON/OFF control function and synchronous motor control provided

- Model variation

STD Standard type

EMC Built-in EMC filter

- Major function

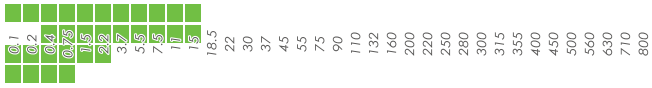
Side-by-side installation; Frequency setting volume control; Synchronous motor driving

- International standard

EC Directive (CE marking); UL Standards (cUL Standards)

- Input voltage class/capacity range

Three-phase 200V/0.1 to 15kW
Three-phase 400V/0.4 to 15kW
Single-phase 200V/0.1 to 2.2kW
Single-phase 100V/0.1 to 0.75kW



Variable Torque Load Inverters for Fans and Pumps

FRENIC-Eco

RoHS

- Series of inverters developed exclusively for square reduction loads such as fans and pumps
- Equipped with various functions including new system of automatic energy saving, PID control, life expectancy prediction and commercial power supply operation switching sequence
- Ideal for air-conditioning systems, fans and pumps, for which conventional general-purpose inverters could not be used due to cost and function issues

- Model variation

STD Standard type

- Major function

Side-by-side installation (5.5 kW or smaller); Optimized minimum power control; Detachable keypad

- International standard

EC Directive (CE marking); UL Standards (cUL Standards)

- Input voltage class/capacity range

Three-phase 200V/0.75 to 110kW Three-phase 400V/0.75 to 560kW

High Performance Inverters

FRENIC-Ace

RoHS

- Series of inverters applicable to diverse appl ications ranging from simple variable-speed applications to business sector-specific machines requiring high performance and multiple functions
- Capable of four load ratings according to applied load, optimizing total cost and offering space-saving performance*1
- Customizable logic function provided as standard feature to allow up to 200 steps of programming

- Model variation

STD Standard type

EMC Built-in EMC filter

- Major function

Side-by-side installation; Synchronous motor driving; Detachable keypad; Pulse train input; Customizable logic; Four ratings (HHD /HND HD / ND); Functional safety STO

- International standard

EC Directive (CE marking); UL Standards (cUL Standards)

- Input voltage class/capacity rang

Three-phase 200V/0.1 to 30kW (ND)
Three-phase 400V/0.4 to 315kW (HND)
Single-phase 200V/0.1 to 2.2kW (HHD)

*1 Three-phase 400V only *2 FRN□□□E2S-○G●, FRN□□□E2S-○K and FRN□□□E2S-○J only

Standard Standard product Semi-standard Semi-standard product

Inverter for HVAC Applications

FRENIC-HVAC

RoHS

- Series of inverters equipped with energy-saving and special functions required for air conditioning market and designed exclusively for specific market
- EMC filter and DC reactor (DCR) provided as standard equipmen *1
- Compliance with the protective structure IP55*1
- Equipped with functions suited for air conditioning applications including 4PID control, real time clock, torque-vector control, filter clogging prevention and linearization function

• Model variation

STD Standard type

• Major function

Calendar function, Linearization function, Customizable logic, Optimized minimum power control

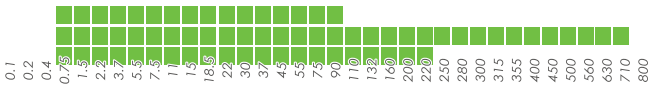
• International standard

EC Directive (CE marking)

UL Standards (cUL Standards)

• Input voltage class/capacity range

Three-phase200V/0.75 to 90kW
Three-phase400V/0.75 to 710kW
Three-phase575V/0.75 to 220kW



*1 DC reactors of three-phase 200 V: 0.75 to 45 kW and three-phase 400 V: 0.75 to 90 kW are built in *2 Compatible with three-phase 200 V: 0.75 to 45kW and three-phase 400 V: 0.75 to 90 kW.

High Performance Multifunctional Inverters

FRENIC-MEGA

RoHS

- Series of general-purpose inverters provided with best-in-class vector functions including vector control with and without speed sensor, PG vector control, dynamic torque vector control and V/f control
- Various functions suited for applications available such as improved brake signal, dancer control function, pulse train input function, ratio operation and customizable logic function
- Built-in USB board allowing management of various types of inverter information, facilitating maintenance

• Model variation

STD Standard type, EMC Built-in EMC filter, DCR Integrated DC reactor

• Major function

Optimized minimum power control, Detachable keypad, Built-in USB terminal, Pulse train input, Ratio operation, Customizable logic, Triple ratings

• International standard

EC Directive (CE marking)

UL Standards (cUL Standards)

• Input voltage class/capacity range

Three-phase200V/0.4 to 90kW (HD)
Three-phase400V/0.4 to 630kW (HD)

High Performance Vector Control Inverter

FRENIC-VG

RoHS

Fuji's highest-performance series of inverters bringing vector inverter technologies together
Provided with vector control with and without speed sensor and V/f control
Full-fledged maintenance functions enabled by calendar function and traceback
Safety function (STO) compliant with functional safety standard EN61800-5-2 provided as standard feature
Stack type three-phase 690 V 355 to 450 kW provided with new device (SiC hybrid module) capable of realizing significant reduction of generated loss as compared with conventional Si module
A Marine standard compatible product lineup has been added as semi-standard products. (Certifying body:DNV GL classification societies)*1*2

• Model variation

STD Standard type

• Major function

Detachable keypad, UPAC, Synchronous motor driving, Triple ratings, Functional safety STO, Position control, Load compensating control, Calendar function

• International standard

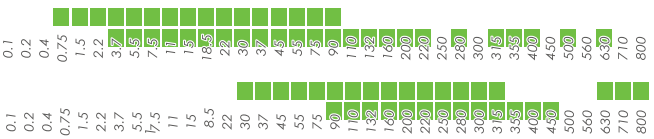
EC Directive (CE marking)

UL Standards (cUL Standards)

• Input voltage class/capacity range

Unit Type
Three-phase200V/0.75 to 90kW (HD)
Three-phase400V/3.7 to 630kW (HD)

Stack Type
Three-phase400V/30kW to 800kW (MD)
Three-phase690V/90kW to 450kW (MD)



*1 Three-phase 690V stack type only. *2 Consult our sales representatives.

APPLICATIONS

Applications		FRENIC-AQUA	FRENIC-HVAC	FRENIC-MEGA	FRENIC-Lift NEW
Fans	Exhaust fan		●		
	AHU (air handling unit)		●		
	Compressor		●	●	
	Air-conditioning system		●	●	
	Dryer		●	●	
	Boiler fan		●	●	
	Fans for controlling furnace temperature		●	●	
	Roof fans controlled as a group		●	●	
	Refrigerator		●	●	
	Built-in blower in film-manufacturing machines	●	●	●	
	Cooling-tower fan		●	●	
	Ventilating fan		●	●	
	Separator fan		●	●	
Machine Tools	Grinding machine				
	Polishing machine				
	Milling machine				
	Lathe				
	Boring machine				
	Turntable			●	
	Work positioning unit			●	
	PCB drilling machine			●	
	Winding machine			●	
	Press			●	
Electric Pumps	Chillers			●	
	Drinking water supply	●	●		
	Tankless water-supply system	●			
	Submersible pump	●		●	
	Vacuum pump	●		●	
	Fountain pump	●		●	
	Cooling water pump	●		●	
	Circulating hot water pump	●		●	
	Well pump	●		●	
	Irrigation	●		●	
	Water treatment system	●		●	
	Constant-flow pump	●		●	
	Sludge pump	●		●	
	Solar pumping			●	
Conveyance machinery	Cranes (travelling, traversing, hoisting)	●	●	●	
	Automated warehouse			●	
	Conveyor (belt, chain, screw, roller)			●	
	Lift			●	●
	Car parking system			●	
	Elevator, escalator			●	●
	Automatic door			●	
	Shutter			●	
Chemical machinery / wood working machines	Fluids mixing machine			●	
	Extruder			●	
	Vibrator			●	
	Centrifugal separator			●	
	Coating machine			●	
	Take-up roller			●	
	Router machine			●	
	Planing machine			●	
Packaging machinery	Individual packing / inner packing			●	
	Packing machine			●	
	Outer packing machine			●	
Food processing machinery	Food mixer			●	
	Food slicer			●	
	Grain processing machine			●	
	Tea manufacturing machine			●	
	Rice milling machine			●	
	Rice sorters			●	
Paper making / textile machinery	Spinning machine			●	
	Knitting machine			●	
	Textile printing machine			●	
	Industrial sewing machine			●	
	Synthetic fiber manufacturing plant				
	Slitters			●	
Other machinery	Automated food / medicine blending machine			●	
	Commercial-use washing machine			●	
	Offset printing press			●	
	Bookbinding machine			●	
	Car washing machine			●	
	Shredder			●	
	Food washing machine			●	
	Test equipment			●	
	Crushers			●	
	Air curtains / window shades / kitchen ventilating fans				

APPLICATIONS

Applications		FVR-Micro	FRENIC-Ace NEW	FRENIC-Mini C2	FRENIC-VG1
Fans	Exhaust fan				
	AHU (air handling unit)				
	Compressor		●	●	●
	Air-conditioning system	●	●	●	
	Dryer	●	●	●	
	Boiler fan		●	●	
	Fans for controlling furnace temperature		●	●	
	Roof fans controlled as a group	●	●	●	
	Refrigerator		●	●	●
	Built-in blower in film-manufacturing machines		●	●	
	Cooling-tower fan		●		
	Ventilating fan	●	●	●	
	Separator fan		●	●	
Machine Tools	Grinding machine				●
	Polishing machine				●
	Milling machine				●
	Lathe				●
	Boring machine		●	●	●
	Turntable		●	●	●
	Work positioning unit		●	●	●
	PCB drilling machine		●	●	●
	Winding machine		●	●	●
	Press		●		●
Electric Pumps	Chillers			●	
	Drinking water supply			●	
	Tankless water-supply system		●	●	
	Submersible pump		●	●	
	Vacuum pump		●	●	●
	Fountain pump		●	●	
	Cooling water pump		●	●	
	Circulating hot water pump		●	●	
	Well pump		●	●	●
	Irrigation		●	●	●
	Water treatment system		●	●	
	Constant-flow pump		●		●
	Sludge pump		●	●	
	Solar pumping		●		
Conveyance machinery	Cranes (travelling, traversing, hoisting)		●		●
	Automated warehouse		●	●	●
	Conveyor (belt, chain, screw, roller)	●	●	●	●
	Lift		●		●
	Car parking system		●		●
	Elevator, escalator		●		●
	Automatic door		●	●	●
	Shutter		●	●	●
Chemical machinery / wood working machines	Fluids mixing machine		●	●	●
	Extruder		●		●
	Vibrator		●	●	●
	Centrifugal separator	●	●	●	●
	Coating machine		●	●	●
	Take-up roller		●	●	●
	Router machine		●	●	●
	Planing machine		●	●	●
Packaging machinery	Individual packing / inner packing	●	●	●	●
	Packing machine	●	●	●	●
	Outer packing machine		●	●	●
Food processing machinery	Food mixer		●	●	●
	Food slicer		●	●	
	Grain processing machine	●	●	●	●
	Tea manufacturing machine		●	●	●
	Rice milling machine		●	●	●
	Rice sorters	●	●	●	●
Paper making / textile machinery	Spinning machine		●	●	●
	Knitting machine		●	●	●
	Textile printing machine		●	●	●
	Industrial sewing machine		●	●	●
	Synthetic fiber manufacturing plant				●
	Slitters		●	●	
Other machinery	Automated food / medicine blending machine		●	●	●
	Commercial-use washing machine		●	●	●
	Offset printing press		●	●	●
	Bookbinding machine		●	●	●
	Car washing machine	●	●	●	●
	Shredder	●	●	●	●
	Food washing machine		●	●	●
	Test equipment		●	●	●
	Crushers		●		●
	Air curtains / window shades / kitchen ventilating fans	●		●	

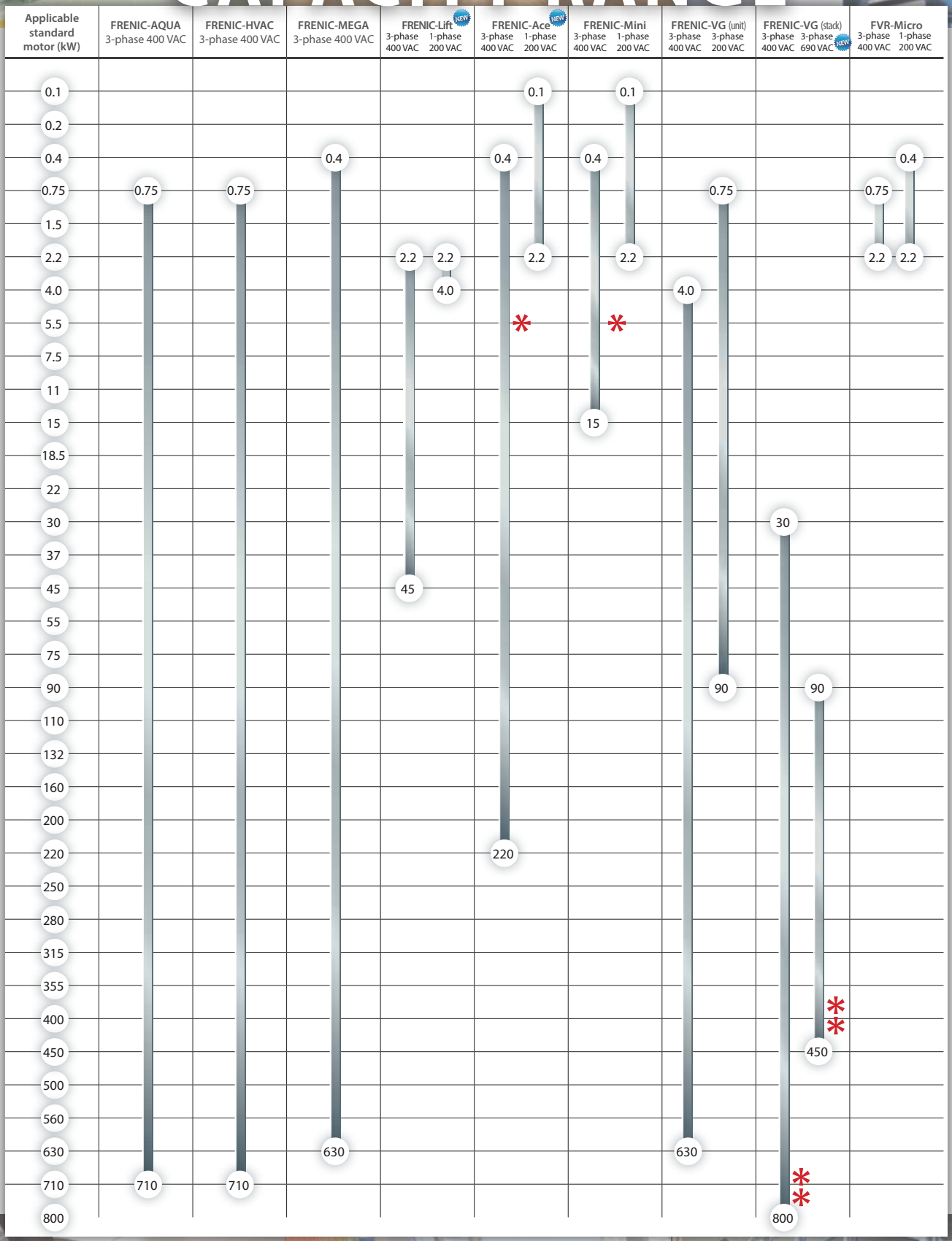
OPTIONS

Options		FRENIC-AQUA	FRENIC-HVAC	FVR-Micro	FRENIC-Mini
Fieldbus Options	CC-Link communication card	●	●		
	DeviceNet communication card	●	●		
	PROFIBUS DP communication card	●	●		
	CANopen communication card	●	●		
	LonWorks communication card	●	●		
	Ethernet communication card	●	●		
	T-Link communication card				
	SX bus communication card				
	E-SX bus communication card				
	PROFINET-RT communication card				
	PROFINET-IRT communication card				
	High-Speed serial communication card (for UPAC)				
	Terminal block for high speed communication				
Other Options	Battery	●	●		
	Relay output interface card	●	●		
	Analog input interface card	●	●		
	Analog current output interface card	●	●		
	Pt100 temperature sensor input card	●	●		
	Additional analog input/output card				
	Additional digital input/output card				
	Additional digital input card				
	Additional digital output card				
	Analog output (x 2ch)				
	PG (encoder) interface 12-15V HTL				
	PG (encoder) interface 5V TTL line driver				
	PG (encoder) interface 5V TTL (not line driver)				
	PG (encoder) interface 5V TTL (not line driver) for synchronous operation				
	Gray Code / switching signals 5V TTL line driver encoder interface				
	RS-485 option with 2RJ45 connectors for branch connection				
	RS-485 communication interface				
	RS-485 option cage clamp terminal				
	Pulse output divider card				
	SinCos, SinCos encoder interface				
	SinCos, EnDat 2.1 encoder interface				
	Hiperface encoder interface				
	SSI encoder interface				
	Biss encoder interface				
	Synchronized interface				
	F/V converter				
	User programming card				
	Functional safety card				
	PG interface card / Open collector				
	PG interface card / ABS encoder with 17-bit high resolution				
	PG card for synchronous motor drive / Open collector				
	PG card for synchronous motor drive / Line driver				

OPTIONS

Options		FRENIC-MEGA	FRENIC-Ace NEW	FRENIC-Lift NEW	FRENIC-VG1
Fieldbus Options	CC-Link communication card	●	●		●
	DeviceNet communication card	●	●		●
	PROFIBUS DP communication card	●	●		●
	CANopen communication card	●	●		
	LonWorks communication card				
	Ethernet communication card	●	●		
	T-Link communication card	●			●
	SX bus communication card	●			●
	E-SX bus communication card				●
	PROFINET-RT communication card	●	●		
	PROFINET-IRT communication card				●
	High-Speed serial communication card (for UPAC)				●
	Terminal block for high speed communication				●
Other Options	Battery				●
	Relay output interface card	●			
	Analog input interface card				
	Analog current output interface card				
	Pt100 temperature sensor input card				
	Additional analog input/output card	●	●		●
	Additional digital input/output card		●		●
	Additional digital input card	●			●
	Additional digital output card	●			
	Analog output (x 2ch)	●			
	PG (encoder) interface 12-15V HTL	●	●	●	
	PG (encoder) interface 5V TTL line driver	●		●	●
	PG (encoder) interface 5V TTL (not line driver)		●		
	PG (encoder) interface 5V TTL (not line driver) for synchronous operation				
	Gray Code / switching signals 5V TTL line driver encoder interface			●	
	RS-485 option with 2RJ45 connectors for branch connection		●		
	RS-485 communication interface				
	RS-485 option cage clamp terminal				
	Pulse output divider card			●	
	SinCos, SinCos encoder interface			●	
	SinCos, EnDat 2.1 encoder interface			●	
	Hiperface encoder interface			●	
	SSI encoder interface			●	
	Biss encoder interface			●	
	Synchronized interface				●
	F/V converter				●
	User programming card				●
	Functional safety card				●
	PG interface card / Open collector				●
	PG interface card / ABS encoder with 17-bit high resolution				●
	PG card for synchronous motor drive / Open collector				●
	PG card for synchronous motor drive / Line driver				●

CAPACITY RANGE



* More capacities up to 3 MW available in dual rating and multi drive system.

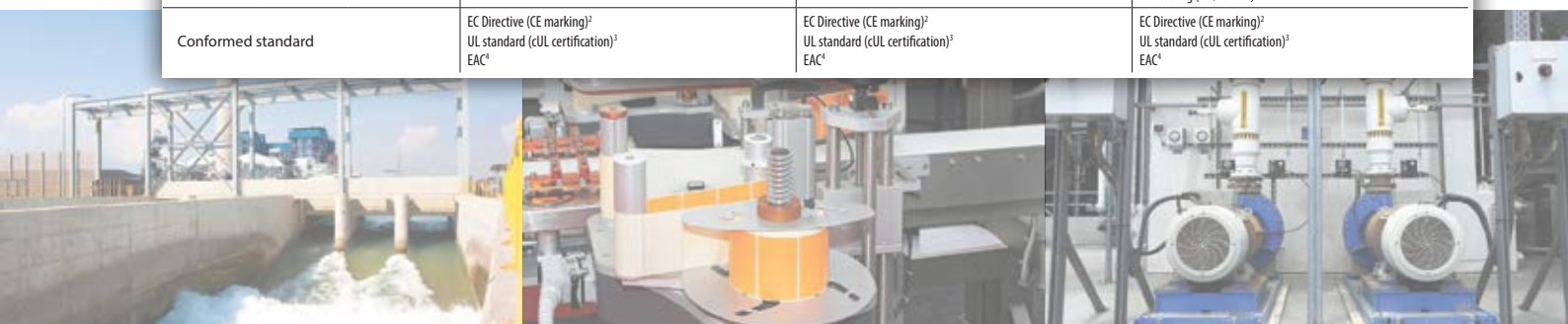
* 3-phase 400 VAC, 5.5 to 15 kW, w/o EMC-filter built-in

SPECIFICATIONS

			FRENIC-AQUA *(AQ1)*	FRENIC-HVAC *(AR1)*	FRENIC-Mini *(C2)*
Input ratings	Phase, Voltage, Frequency	3-phase 400 VAC	380 to 440 VAC, 50 Hz / 390 to 480 VAC, 60 Hz	380 to 440 VAC, 50 Hz / 390 to 480 VAC, 60 Hz	380 to 480 VAC, 50/60 Hz
		3-phase 200 VAC	---	---	---
		1-phase	---	---	200 to 240 VAC, 50/60 Hz
	Variations		Voltage: +10 to -15% (Voltage unbalance: 2% or less) Frequency: +5 to -5%	Voltage: +10 to -15% (Voltage unbalance: 2% or less) Frequency: +5 to -5%	Voltage: +10 to -15%, voltage unbalance: 2% or less (3-phase, 400 VAC) / +10 to -10% (1-phase, 200 VAC) Frequency: +5 to -5%
Output overload capability			110% -1 min (Overload tolerated interval: compliant with IEC 61800-2)	110% -1 min (Overload tolerated interval: compliant with IEC 61800-2)	150% of rated current for 1 min or 200% of rated current for 0.5 s
Output frequency setting	Maximum frequency		25 to 120 Hz	25 to 120 Hz	25 to 400 Hz
	Base frequency		25 to 120 Hz	25 to 120 Hz	25 to 400 Hz
	Starting frequency		0.1 to 60.0 Hz	0.1 to 60.0 Hz	0.1 to 60.0 Hz
	Carrier frequency		0.75 to 16 kHz	0.75 to 16 kHz	0.75 to 16 kHz Note: the unit is equipped with an automatic reduction/stop functionthat may automatically drop the carrier frequency to protect the inverter when it is running at frequencies above 6 kHz, depending on ambienttemperature, output current, and other conditions.[1] Under modulated carrier conditions, the system scatters carrier frequency to reduce noise.
Starting torque			100% or higher, reference frequency 1.0 Hz, base frequency 50 Hz, with slip compensation and torque boost active	100% or higher, reference frequency 1.0 Hz, base frequency 50 Hz, with slip compensation and torque boost active	150% or more / frequency set to 3 Hz Slip compensation / automatic torque boost active
Brake	Standard torque (%)[6]		20 (0.75 to 22 kW), 10 to 15 (30 to 710 kW)	20 (0.75 to 22 kW), 10 to 15 (30 to 710 kW)	3-phase 400 VAC: 100 (0.4 to 0.75 kW), 50 (1.5 kW), 30 (2.2 to 4.0 kW), 20 (5.5 to 15 kW, w/o EMC-filter built-in) 1-phase 200 VAC: 150 (0.1/0.2 kW), 100 (0.4/0.75 kW), 50 (1.5 kW), 30 (2.2 kW)
	DC injection braking	Starting frequency	0.0 to 60.0 Hz	0.0 to 60.0 Hz	0.0 to 60.0 Hz
		Braking time	0.0 to 30.0 s	0.0 to 30.0 s	0.0 to 30.0 s
		Braking level	0 to 60%	0 to 60%	0 to 100%
Control method			V/f control with slip compensation, dynamic torque vector control	V/f control with slip compensation, dynamic torque vector control	Induction motor drive: · V/f control · Slip compensation · Automatic torque boost · Dynamic torque vector control Synchronous motor drive: · Sensorless magnetic positioning (speed control range: 10% of base frequency and up)
Acceleration/deceleration time			0.00 to 3600 s	0.00 to 3600 s	0.00 to 3600 s
Multistep frequency			Selectable from 16 steps (step 0 to 15)	Selectable from 16 steps (step 0 to 15)	Selectable from 16 steps (step 0 to 15)
Frequency setting control (analog input)			0 to +10 V DC / 0 to 100% (terminal 12) 4 to +20 mA DC / 0 to 100%, 0 to +20 mA DC / 0 to 100% (terminal C1)	0 to +10 V DC / 0 to 100% (terminal 12) 4 to +20 mA DC / 0 to 100%, 0 to +20 mA DC / 0 to 100% (terminal C1)	0 to +10 V DC / 0 to 100% (terminal 12) 4 to +20 mA DC / 0 to 100%, 0 to +20 mA DC / 0 to 100% (terminal C1)
Standard functions			· Fire mode (forced operation) · Customized logic · Multi pump control · Real time clock	· 4 PID control · Motor pick up function · Customized logic · Filter clogging prevention · Real time clock	· PID control function · Sensorless synchronous motor control · RS 485 communication port · Braking signal function · Motor switching function, motor auto-tuning · High starting torque, at 150% or more · Braking resistor connectable to the inverter · Tripless deceleration by automatic deceleration control · Automatic energy-saving function · Frequency setting potentiometer
Protection			· Short-circuit · Ground fault · Overvoltage · Undervoltage · Motor overload (PTC)	· Short-circuit · Ground fault · Overvoltage · Undervoltage · Motor overload (PTC)	Overcurrent, Short-circuit, Ground fault, Overvoltage, Under-voltage, Input phase loss, Output phase loss, Inverter overheat, Braking resistor overheat, Overload, Motor Electronic thermal overload relay, PTC Thermistor, Motor Overload early warning, Stall prevention, Step-out detection, External alarm input, Memory error , Remote keypad (option), communications error, CPU error, Operation Error, Tuning error, RS-485 communications error, Data save error during undervoltage, Surge protection, Protection against momentary power failure , Overload prevention control, Mock alarm, PID feedback wire break detection
Enclosure (IEC/EN60529)			IP21/IP55 (0.75 to 90 kW), IP00 (110 to 710 kW)	IP21/IP55 (0.75 to 90 kW), IP00 (110 to 710 kW)	IP20 (IEC 60529:1989) / UL open type (UL50)
Cooling method			Natural cooling (0.75 to 2.2 kW), Fan cooling (4.0 to 710 kW)	Natural cooling (0.75 to 2.2 kW), Fan cooling (4.0 to 710 kW)	3-phase 400 VAC: Natural cooling (0.4/0.75 kW), Fan cooling (1.5 to 15 kW) 1-phase 200 VAC: Natural cooling (0.1 to 0.75 kW), Fan cooling (1.5/2.2 kW)
Conformed standard			EC Directive (CE marking)[2] UL standard (cUL certification)[3] EAC[4]	EC Directive (CE marking)[2] UL standard (cUL certification)[3] EAC[4]	EC Directive (CE marking)[2] UL standard (cUL certification)[3] EAC[4]

5 Functional Safety: EN61800-5-2: SIL2, ISO13849-1, SIL2, PL=d, cat. 3, Safe torque off, stop cat. 0
6 Ratings applicable when no optional braking resistor is installed.
7 With dynamic torque-vector control selected.

1 Only valid when induction motor drive is in operation.
2 EMC Directive: EN61800-3 / Low Voltage Directive: EN61800-5-1
3 UL508, C22.2 No 14
4 GOST-R, GOST-K, GOST-B



SPECIFICATIONS

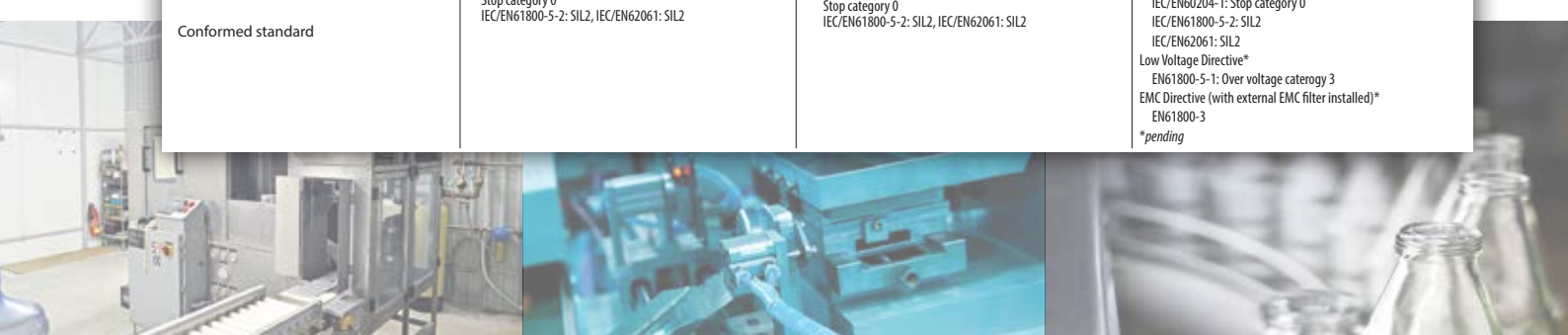
			FVR-Micro *(S2S)* NEW	FRENIC-Ace *(E2)* NEW	FRENIC-MEGA *(G1)*	FRENIC-Lift *(LM2A)* NEW
Input ratings	Phase, Voltage, Frequency	3-phase 400 VAC	280 to 440 VAC, 50/60Hz	380 to 480 VAC, 50/60 Hz	380 to 480 VAC, 50/60 Hz (up to 55 kW) 380 to 440 VAC, 50 Hz 380 to 480 VAC, 60 Hz (75 kW or above)	380 to 480 VAC, 50/60 Hz
		3-phase 200 VAC	---	200 to 240 VAC, 50/60 Hz	200 to 240 VAC, 50/60 Hz (up to 22 kW) 200 to 220 VAC, 50 Hz, 200 to 230 VAC, 60 Hz (30 kW and above)	---
		1-phase	220 to 230 VAC, 50/60Hz	---	---	200 to 240 VAC, 50/60 Hz
	Variations		Voltage: -15% to +10% Frequency: 47 to 63 Hz	Voltage: +10 to -15%, voltage unbalance: 2% or less / Frequency: +5 to -5%	Voltage: +10 to -15%, voltage unbalance: 2% or less / Frequency: +5 to -5%	Voltage: +10 to -15%, Frequency: -5 to +5% Voltage unbalance for 3-phase: 2% or less according to IEC61800-3
Output overload capability			150% of rated current 1 minute 180% of rated current 10 seconds 200% of rated current 1 second	150% of rated current for 1 min (HHD) (HD) 120% of rated current for 1 min (ND) (HND) 200% of rated current for 3 seconds (HHD)	150% of rated current for 1 min (HD) (MD) 120% of rated current for 1 min (LD) 200% of rated current for 3 seconds (HD)	200% for 3 sec
Output frequency setting	Maximum frequency		0.0 to 400 Hz variable setting	HHD/HND/HD mode: 25 to 500 Hz variable under V/f control, Magnetic pole position sensorless vector control) (Up to 200 Hz under vector control with speed sensor) ND mode: 25 to 120 Hz (under any drive control)	25 to 500 Hz (120 Hz for inverters in MD/LD mode)	1 to 200 Hz (1.20 to 12000 rpm)
	Base frequency		0.0 to 400 Hz variable setting	25 to 500 Hz variable (in conjunction with max. frequency)	25 to 500 Hz variable (in conjunction with max. frequency)	1 to 200 Hz (1.20 to 12000 rpm)
	Starting frequency		0.0 to 50 Hz	0.1 to 60.0 Hz variable (0.0 Hz under vector control with speed sensor)	0.1 to 60 Hz variable setting	Dynamic torque vector control: 0.1 Hz Vector control with PG: 0.0 Hz
	Carrier frequency		1 to 8 kHz variable setting	3-phase 200 VAC series FRN0030/0040/0056/0069E -2 : • 0.75 to 16 kHz variable (HHD/HND mode) 3-phase 400 VAC series,FRN0022/0029/0037/0044/0059E2 S-4 : • 0.75 to 16 kHz variable (HHD/HND/HD mode) • 0.75 to 10 kHz variable (ND mode) FRN0072/0085/0105/0139/0168E2 -4 : • 0.75 to 16 kHz variable (HHD mode) • 0.75 to 10 kHz variable (HND/HD mode) • 0.75 to 6 kHz variable (ND mode) FRN0203E2 -4 or above: • 0.75 to 10 kHz variable (HHD mode) • 0.75 to 6 kHz variable (HND/HD/ND mode)	0.1 to 60 Hz variable setting · 0.75 to 16 kHz (HD mode: 0.4 to 55 kW, LD mode: 5.5 to 18.5 kW) · 0.75 to 10 kHz (HD mode: 75 to 400 kW, LD mode: 22 to 55 kW) · 0.75 to 6 kHz (HD mode: 500 and 630 kW, LD mode: 75 to 500 kW) · 0.75 to 4 kHz (LD mode: 630 kW) · 0.75 to 2 kHz (MD mode: 90 to 400 kW)	5 to 16 kHz
Starting torque				3-phase 200 VAC series: 200% or above, reference frequency 0.5 Hz (HHD FRN0069E2 -2 or below), 150% or above, ref. frequency 0.5 Hz (HND FRN0069E2 -2 or below), 3-phase 400 VAC series: 200% or above, ref. frequency 0.5 Hz (HHD FRN0072E2 -4 or below), 150% or above, ref. frequency 0.5 Hz (HHD FRN0085E2 -4 or above), 120% or above, ref. frequency 0.5 Hz (HND/ND), 150% or above, ref. frequency 0.5 Hz (HD), Base frequency 50 Hz, with slip compensation and auto torque boost active	200% (22 kW or smaller)[7] 180% (30 kW or larger)[7]	200%
Brake	Standard torque (%)[6]					80% (Average torque for 60 s braking with 50%ED)
	DC injection braking	Starting frequency	0.0 to max. frequency	0.0 to 60.0 Hz	0.1 to 60.0 Hz	0.00 to 5.00 Hz (0.00 to 300.00 rpm)
		Braking time	0.0 to 50.0 s	0.0 to 30.0 s	0.0 to 30.0 s	0.00 to 30.00 s
		Braking level	0 to 100%	0 to 100%	0 to 100%	0 to 100 %
Control method			V/f control (possibility of Auto slip compensation)	Induction motor drive: V/f control · Vector control without speed sensor (Dynamic torque vector) · V/f control, with slip compensation · V/f control, with slip sensor (PG option) · V/f Control with speed sensor (+Auto Torque Boost) (PG option) · Vector control with speed sensor (PG option) / Synchronous motors: Vector control without magnetic pole position sensor	V/f control, Dynamic torque-vector control, V/f control, the slip compensation is available, V/f control w/ speed sensor (PG optional), Dynamic torque vector control speed sensor (PG optional), Speed sensorless vector control, Vector control w/ speed sensor (PG optional)	· Vector control with PG (Asynchronous Motor) · Vector control with PG (Synchronous Motor) · Dynamic torque vector control without PG (Asynchronous Motor) · Vector control with Peripheral PG (Synchronous Motor) · Sensor-less vector control for rescue operation (Synchronous Motor) (coming soon)
Acceleration/deceleration time			0.00 to 3600 s	0.00 to 6000 s	0.01 to 6000 s	0.00 to 99.9 s
Multistep frequency			16 steps	16 steps	16 steps	16 steps
Frequency setting control (analog input)			0 to +10 V DC or 0 to 20 mA selectable	Term [12]: 0 to ±10 VDC (±5 VDC)/ 0 to ±100%, 0 to +10 VDC (+5 VDC)/ 0 to +100%, Term [C1] C1 function: 4 to 20 mA DC/ 0 to +100% / 0 to ±100%, 0 to 20 mA DC/ 0 to +100% / 0 to ±100% Term [C1] V2 function: 0 to +10 VDC (+5 VDC)/ 0 to +100% / 0 to ±100% Inverse function available (20 to 4; 20 to 0)	0 to +10 V DC (inverse mode available) , 0 to +10 V DC (inverse mode available), 4 to +20 mA (inverse mode available)	0 to ±10 VDC (2 inputs) 4 to 20 mADC
Standard functions			Setting max/min output frequency; momentary power off restarting; fault, restarting; acceleration/deceleration time; auto-voltage stabilizing output modulation; digital frequency output signal; fault records; parameters locking; reset to factory setting; over voltage stalling prevention, electronic thermal relay, traverse function, PID control, non-linear V/f pattern	Customizable logic, Droop control, Torque control, PID Control (with Dancer control), Torque limiter, Auto-tuning, Online tuning, 1st and 2nd motor settings, Zero speed control, Cooling fan ON/OFF control, Speed control, Positioning control with pulse counter, Master-follower operation, Pre-excitation, DC Braking, Mechanical brake control	Bias frequency, Gain for frequency setting, High and low frequency limiter, Jump frequency control, Slip compensation, Auto-restart after momentary power failure, Automatic deceleration, Torque limiting, Energy saving operation, Automatic torque boost, PID control, Link operation, Fan stop operation, Droop operation, Torque control	Forward rotation, reverse rotation and stop command, coast-to-stop command, alarm reset, forced stop, Multistep speed, analog signal for speed reference, multi-function keypad, communication, individual settings of each point of start, acceleration completion, deceleration beginning, and stop, ASR feedforward compensation, ASR parameter change, Digital torque bias, Analog torque bias, Motor parameters tuning, Pole position tuning, Unbalanced load compensation, Creepless operation, Battery operation, digital output for short circuit for motor phases at stopping (PM motors), hidden parameters depending on control mode, Distance estimation for acceleration/deceleration, Rescue operation by motor brakes control,function for EN81-1 A3 UCM, Trip counter for EN81-1 A3. Safety gear function, Output phase rotation,customizable logic interface, etc.
Protection			Overcurrent, Overvoltage, Overheating, Low voltage, Output current limiting, Inverter overload, Motor overload, External alarm, Communications alarm,	Overcurrent (short-circuit, ground fault), Overvoltage, Incoming surge, Undervoltage, Input phase loss, Overheating, Motor overload (Electronic thermal overlaod trip), Stall prevention, External alarm input, Memory error, Communication error, (KEYPAD, Option, RS-485), CPU error, Option error, Output phase loss error	Overcurrent (short-circuit, ground fault), Overvoltage, Incoming surge, Undervoltage, Input phase loss, Overheating, Motor overload (Electronic thermal overlaod trip), Stall prevention, External alarm input, Memory error, Communication error, (KEYPAD, Option, RS-485), CPU error, Option error, Output phase loss error	Overcurrent, short circuit, grounding fault, overvoltage, undervoltage, input phase loss, output phase loss, overheating, overload, external alarm, motor protection (electronic thermal and PTC), memory error, keypad communication error, CPU error, option communication error, option error, operation error, tuning error, RS485 communication error, data save error upon undervoltage, option hardware error, EN terminal circuit error, PG wiring broken, CAN bus communication error, overspeed prevention, speed mismatching, charging circuit fault, over torque current, etc.
Enclosure (IEC/EN60529)			IP00	IP20 closed type, UL open type (22 kW or smaller), IP00 open type, UL open type (30 kW or larger)	IP20 (IEC60529) closed type, UL open type (UL50) (22 kW or smaller), IP00 open type, UL open type (30 kW or larger)	IP20 + IP54 Heat sink (From 2.2 to 15 kW) IP20 (from 18,5 to 22 kW), IP00 (from 30 to 45 kW)
Cooling method			Single-phase 230 V 0.4-0.75 kW natural cooling Single-phase 230 V 1.5-2.2 kW fan cooling Three-phase 400 V 0.75-2.2 kW fan cooling	Fan cooling	Natural cooling (1.5 kW or smaller) Fan cooling (2.2 kW or larger)	Fan cooling
Conformed standard			EC Directive (CE marking)[2]	EC Directive (CE marking)[2], UL standard (cUL certification)[4], EAC[3], STO[5]	EC Directive (CE marking)[2], UL standard (cUL certification)[4], EAC[3], STO[5]	- EC Directive (CE marking)[1] - EAC[2] - Canada Safety Standard: CSA B44.1-11/ASME A17.5-2011 - Lift Directive (in extracts) EN 81-1 +A3 According to contactors less, brake monitoring (UCM) and Travel direction counter - Low Voltage Directive,EN61800-5-1: Over voltage category 3 - EMC Directive: EN12015, EN12016, EN 61800-3 +A1, EN 61326-3 1, (Emission) Built-in EMC filter type : Category 2 (0025 (11kW) or lower), Category 3 (0032 (15kW) or higher), (Immunity) 2nd Env. - Machinery Directive EN ISO13849-1: PL-e / EN60204-1: stop category 0 EN61800-5-2: STO SIL3 / EN62061: SIL3

SPECIFICATIONS

			FRENIC-VG *(VG1 unit)*	FRENIC-VG *(VG1 stack / 400 V)*	FRENIC-VG *(VG1 stack / 690 V)* NEW
Input ratings	Phase, Voltage, Frequency	3-phase 400 VAC	380 to 480 VAC, 50/60 Hz (3.7~55 kW) 380 to 440 VAC, 50 Hz (55~630 kW) 380 to 480 VAC, 60 Hz (55~630 kW)	380 to 440 VAC, 50 Hz 380 to 460 VAC, 60 Hz (For additional information refer to RHC-D and RHD-D specifications)	660 to 690 VAC, 50/60 Hz 575 to 600 VAC, 50/60 Hz (For additional information refer to RHC-D and RHD-D specifications)
		3-phase 200 VAC	200 to 230 VAC, 50/60 Hz (0.75~22 kW) 200 to 220 VAC, 50 Hz (30~90 kW) 200 to 230 VAC, 60 Hz (30~90 kW)	---	---
		1-phase	---	---	---
	Variations		Voltage: +10 to -15%, Frequency: -5 to +5% Voltage unbalance for 3-phase: 2% or less according to IEC61800-3	Voltage: +10 to -15%, Frequency: -5 to +5% Voltage unbalance for 3-phase: 2% or less according to IEC61800-3 (For additional information refer to RHC-D and RHD-D specifications)	Voltage: +10 to -15%, Frequency: -5 to +5% Voltage unbalance for 3-phase: 2% or less according to IEC61800-3 (For additional information refer to RHC-D and RHD-D specifications)
Output overload capability			150% of rated current for 1 min (HD) (MD) 120% of rated current for 1 min (LD) 200% of rated current for 3 seconds (HD)	150% of rated current for 1 min (MD) 110% of rated current for 1 min (LD)	150% of rated current for 1 min (MD) 110% of rated current for 1 min (LD)
Output frequency setting	Maximum frequency		500 Hz	150 Hz (Vector control with PG for IM, PMSM & V/f) 120 Hz (Vector control without PG for IM)	150 Hz (Vector control with PG for IM, PMSM & V/f) 120 Hz (Vector control without PG for IM)
	Base frequency		500 Hz	150 Hz (Vector control with PG for IM, PMSM & V/f) 120 Hz (Vector control without PG for IM)	150 Hz (Vector control with PG for IM, PMSM & V/f) 120 Hz (Vector control without PG for IM)
	Starting frequency		Vector control with PG (IM/PMSM): 0 Hz, Vector control without PG (IM): 1:250, V/f (IM): 0,2 Hz	Vector control with PG (IM/PMSM): 0 Hz Vector control without PG (IM): 1:250 V/f (IM): 0.2 Hz	Vector control with PG (IM/PMSM): 0 Hz Vector control without PG (IM): 1:250 V/f (IM): 0.2 Hz
	Carrier frequency		2 to 15 kHz (0.75~55 kW in HD) 2 to 10 kHz (75~400 kW in HD) 2 to 5 kHz (500~630 kW in HD) 2 to 4 kHz (90~400 kW in MD) 2 to 10 kHz (30~55 kW in LD) 2 to 5 kHz (75~500 kW in LD) 2 kHz (630 kW in LD)	2 kHz	2 kHz
Starting torque			200% (HD) 150% (MD), 120% (LD)	150% (MD) 110% (LD)	150% (MD) 110% (LD)
Brake	Standard torque (%)		150%	Braking only available when RHC-D is used	Braking only available when RHC-D or BUC-D is used
	DC injection braking	Starting frequency	0.00 to 3600.00 rpm	0.00 to 3600.00 rpm	0.00 to 3600.00 rpm
		Braking time	0.00 to 30.00 s	0.00 to 30.00 s	0.00 to 30.00 s
		Braking level	0 to 100 %	0 to 100 %	0 to 100 %
Control method			· Vector control with PG (IM) · Vector control without PG (IM) · V/f (IM) · Vector control with PG (PMSM)	· Vector control with PG (IM) · Vector control without PG (IM) · V/f (IM) · Vector control with PG (PMSM)	· Vector control with PG (IM) · Vector control without PG (IM) · V/f (IM) · Vector control with PG (PMSM)
Acceleration/deceleration time			0.00 to 99.9 s	0.00 to 99.9 s	0.00 to 99.9 s
Multistep frequency			16 steps	16 steps	16 steps
Frequency setting control (analog input)			0 to ±10 VDC 4 to 20 mADC	0 to ±10 VDC 4 to 20 mADC	0 to ±10 VDC 4 to 20 mADC
Standard functions			Start/stop operation, speed setting, speed detection, speed control, running status signals, acceleration/deceleration times, speed setting gains, jump speed, auto search for idling motor speed, auto-restart after momentary power failure, slip compensation, droop control, torque limit, torque control, PID control, cooling fan ON/OFF control, toggle monitor control, torque bias, motor selection, temperature detection, self-diagnostic function for PG detection circuit, load adaptive control, multiplex system (multiple winding motor drive and direct parallel connection), UP/DOWN control, stop function, PG pulse output, observer, offline tuning, online tuning, position control, pulse train, synchronous operation, STO, SS1, SBC, etc.	Start/stop operation, speed setting, speed detection, speed control, running status signals, acceleration/deceleration times, speed setting gains, jump speed, auto search for idling motor speed, auto-restart after momentary power failure, slip compensation, droop control, torque limit, torque control, PID control, cooling fan ON/OFF control, toggle monitor control, torque bias, motor selection, temperature detection, self-diagnostic function for PG detection circuit, load adaptive control, multiplex system (multiple winding motor drive and direct parallel connection), UP/DOWN control, stop function, PG pulse output, observer, offline tuning, online tuning, position control, pulse train, synchronous operation, STO, SS1, SBC, etc.	Start/stop operation, speed setting, speed detection, speed control, running status signals, acceleration/deceleration times, speed setting gains, jump speed, auto search for idling motor speed, auto-restart after momentary power failure, slip compensation, droop control, torque limit, torque control, PID control, cooling fan ON/OFF control, toggle monitor control, torque bias, motor selection, temperature detection, self-diagnostic function for PG detection circuit, load adaptive control, multiplex system (multiple winding motor drive and direct parallel connection), UP/DOWN control, stop function, PG pulse output, observer, offline tuning, online tuning, position control, pulse train, synchronous operation, STO, SS1, SBC, etc.
Protection			Braking transistor broken, braking resistor overheated, DC fuse blown, excessive positioning deviation, PG communication error, safety circuit error, grounding fault, memory error, keypad communication error, CPU error, network error, RS485 communication error, operation error, output wiring fault, A/D converter error, speed not agreed, UPAC error, inter-inverter communications link error, hardware error, mock alarm, PG failure, input phase loss, start delay, undervoltage, NTC wire brake error, overcurrent, heat sink overheat, external alarm, inverter internal overheat, motor overheat, motor 1 overload, motor 2 overload, motor 3 overload, inverter overload, output phase loss, overspeed, overvoltage, PG wire brake, charger circuit fault, DC fan locked, E-SX bus tact synchronization error, toggle abnormality error, functional safety card error, light alarm (warning), surge protection, main power shut down	Braking transistor broken, braking resistor overheated, DC fuse blown, excessive positioning deviation, PG communication error, safety circuit error, grounding fault, memory error, keypad communication error, CPU error, network error, RS485 communication error, operation error, output wiring fault, A/D converter error, speed not agreed, UPAC error, inter-inverter communications link error, hardware error, mock alarm, PG failure, input phase loss, start delay, undervoltage, NTC wire brake error, overcurrent, heat sink overheat, external alarm, inverter internal overheat, motor overheat, motor 1 overload, motor 2 overload, motor 3 overload, inverter overload, output phase loss, overspeed, overvoltage, PG wire brake, charger circuit fault, DC fan locked, E-SX bus tact synchronization error, toggle abnormality error, functional safety card error, light alarm (warning), surge protection, main power shut down, etc.	Braking transistor broken, braking resistor overheated, DC fuse blown, excessive positioning deviation, PG communication error, safety circuit error, grounding fault, memory error, keypad communication error, CPU error, network error, RS485 communication error, operation error, output wiring fault, A/D converter error, speed not agreed, UPAC error, inter-inverter communications link error, hardware error, mock alarm, PG failure, input phase loss, start delay, undervoltage, NTC wire brake error, overcurrent, heat sink overheat, external alarm, inverter internal overheat, motor overheat, motor 1 overload, motor 2 overload, motor 3 overload, inverter overload, output phase loss, overspeed, overvoltage, PG wire brake, charger circuit fault, DC fan locked, E-SX bus tact synchronization error, toggle abnormality error, functional safety card error, light alarm (warning), surge protection, main power shut down, etc.
Enclosure (IEC/EN60529)			IP20 (from 0.75 to 22 kW), IP00 (from 30 to 630 kW, IP20 available as an option)	IP00	IP00
Cooling method			Fan cooling	Fan cooling	Fan cooling
Conformed standard			EC Directive (CE marking)[2] UL standard (cUL certification)[4] EAC[3] Machinery Directive: IEC/EN ISO13849-1: PL-d, IEC/EN60204-1: Stop category 0 IEC/EN61800-5-2: SIL2, IEC/EN62061: SIL2	EC Directive (CE marking)[2] UL standard (cUL certification)[4] EAC[3] Machinery Directive: IEC/EN ISO13849-1: PL-d, IEC/EN60204-1: Stop category 0 IEC/EN61800-5-2: SIL2, IEC/EN62061: SIL2	Us and Canada Safety Standard* UL, cUL (UL508C, C22.2 No. 14) Machinery Directive* IEC/EN ISO13849-1: PL-d IEC/EN60204-1: Stop category 0 IEC/EN61800-5-2: SIL2 IEC/EN62061: SIL2 Low Voltage Directive* EN61800-5-1: Over voltage caterogy 3 EMC Directive (with external EMC filter installed)* EN61800-3 **pending*

5 Functional Safety: EN61800-5-2: SIL2, ISO13849-1, SIL2, PL=d, cat. 3, Safe torque off, stop cat. 0
6 Ratings applicable when no optional braking resistor is installed.
7 With dynamic torque-vector control selected.

1 Non EMEA standard product.
2 EMC Directive: EN61800-3 / Low Voltage Directive: EN61800-5-1
3 GOST-R, GOST-K, GOST-B
4 UL508, C22.2 No 14



Fuji Electric

Innovating Energy Technology

Compact inverter

FRENIC-Mini Series

COMPACT INVERTER

FRENIC

Mini

FUJI ELECTRIC INVERTERS

High Perfomance
Compact Body
Welcome to the
NEXT Generation
of Compact Inverters

New

Compact

And

High Perfomance

NEXT Generation!

Trading : Engineering Design : Contactor : Service

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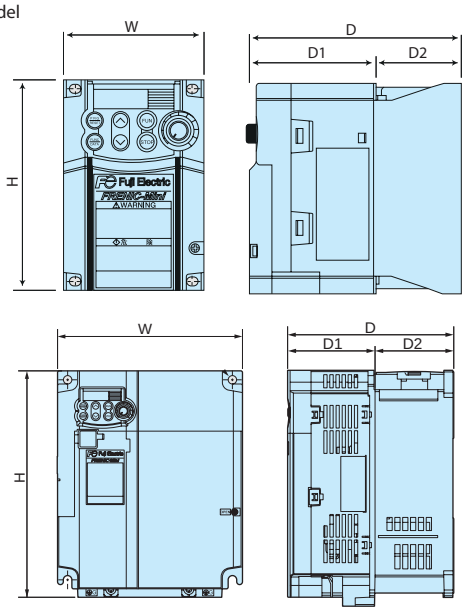
FRENIC-Mini C2

NEW

With its rich functionality, compact design, simple operation, and global compatibility, the new FRENIC-Mini elevates the performance of a wide range of devices and equipment.

Including conveyors, fans, pumps, centrifugal separators, and food processing machines - we provide you the system integration, energy efficiency, reduced labour, and lower overall costs you're looking for.

- High performance and multipurpose
- Induction Motor control (V/f and Dynamic torque vector control), PMS Motor control (open loop)
- Slip compensation controller shortens setting time
- Fastest CPU processor in its class
- Even easier to use and fully compatible with existing products: External dimensions of C1 model equal C2 model
- Optional USB keypad available
  Energy use optimizer
- PID control function
- Cooling fan ON/OFF control function
- Network capabilities standard: RS-485 communications port
- Easier maintenance



Power supply voltage	Applicable standard motor (kW)	Inverter model	Outside dimensions (mm)				
			W	H	D	D1	D2
3-phase 400 VAC w/ EMC filter built-in	0.4	FRN0002C2E-4☐	110	130	158	118	40
	0.75	FRN0004C2E-4☐			182		64
	1.5	FRN0005C2E-4☐	140	180			
	2.2	FRN0007C2E-4☐					
	4.0	FRN0011C2E-4☐					
3-phase 400 VAC w/o EMC filter built-in	5.5	FRN0013C2S-4☐	180	230	158	70.3	87.7
	7.5	FRN0018C2S-4☐					
	11	FRN0024C2S-4☐	220	270	190	100	90
	15	FRN0030C2S-4☐					
1-phase 200 VAC w/ EMC filter built-in	0.1	FRN0001C2E-7☐	80	120	100	90	10
	0.2	FRN0002C2E-7☐					
	0.4	FRN0004C2E-7☐			115		25
	0.75	FRN0006C2E-7☐	110	130	139	99	40
	1.5	FRN0010C2E-7☐	140	180	182	118	64
	2.2	FRN0012C2E-7☐					

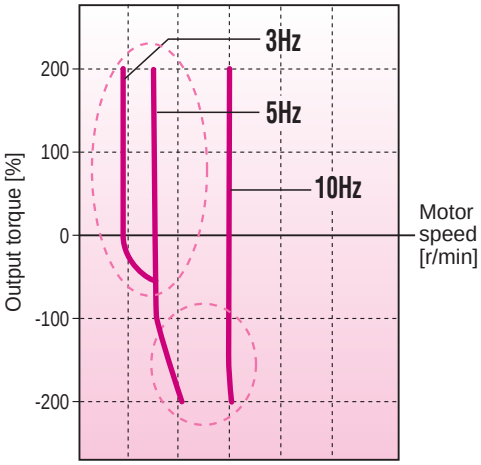
TYPE CODE

FRN 0011 C2 S - 4 A

- FRN: Series name: FRENIC
- 0011: Applicable rated current (this value showes an amperage rating)
- C2: Applied for: Mini, C2 series (successor of C1)
- S: Model: E: EMC filter built-in / S: Without EMC filter
- 4: Input power supply: 4: 3-phase 400 VAC / 7: 1-phase 200 VAC
- A: Destination: A (Asia)

CE
c UL LISTED

High Performance and Multipurpose



Dynamic Torque Vector Control System

Fuji Electric original dynamic torque vector control system is known for its top-of-the line performance, delivering stabile torque output even at low speeds. This feature has a wide range of applications, including conveyors and high-inertia loads that demand high starting torque.

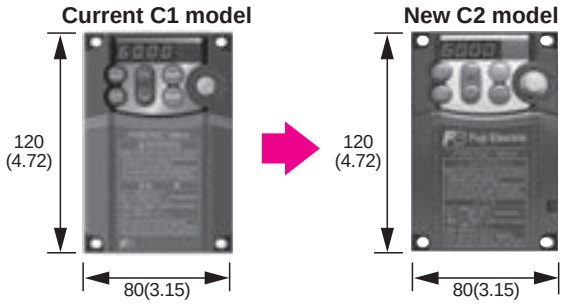
Slip Compensation shortens setting time

The slip compensation controller works with voltage tuning for even more accurate speed control at low velocity. This reduces speed control variability and stabilizing creep speed for more accurate stopping in conveyors and similar equipment.

Fastest CPU Processor in its Class

Advanced CPU processes data at twice the speed of our current model

Full Compatibility and User Friendly Design



Note: Three-phase 200V 0.1–0.75kW dimensions shown (mm(inch))

External dimensions	Interchangeable
Installed dimensions	Interchangeable
Number of terminals	Same for both main circuit and controllers
Terminal position	Compatible terminal wire length
Function codes	Compatible function codes
RS-485 communication	Shared communications protocol

Easy Operation and Maintenance

Usability

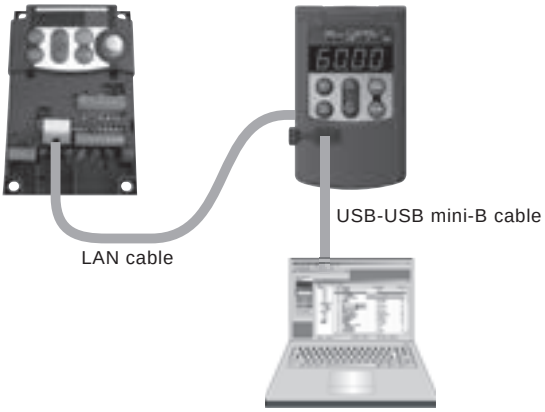
Delivers all the usability of the C1. Provides volume of frequency and the same ease of operation as the current model.

Improve Maintainability

Function	Description
Mock malfunction	Select a function to set off a mock alarm
Number of startups	Count the total number of ON/OFF run cycles
Cumulative motor running time	Monitor motor run time
Total power	Set to measure total power consumption
Trip history	Saves and displays information on up to four past trips

USB Keypad

Optional USB keypad available. Enhanced PC loader software (FRENIC Loader) connectivity.

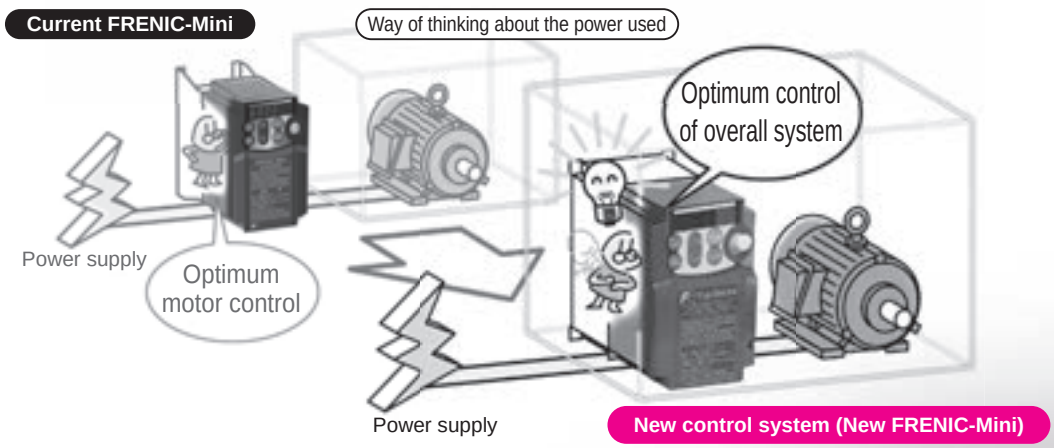


· FRENIC Loader available as a free download

Energy Optimization

Optimum Energy Control

Motor tuning minimizes power loss



PID Control Function

Permits motor operation while controlling temperature, pressure, and flow rate without the use of a temperature controller or other external device

Cooling Fan ON/OFF Control Function

The cooling fan can be switched off when the fan or pump is not running to reduce both noise and energy consumption

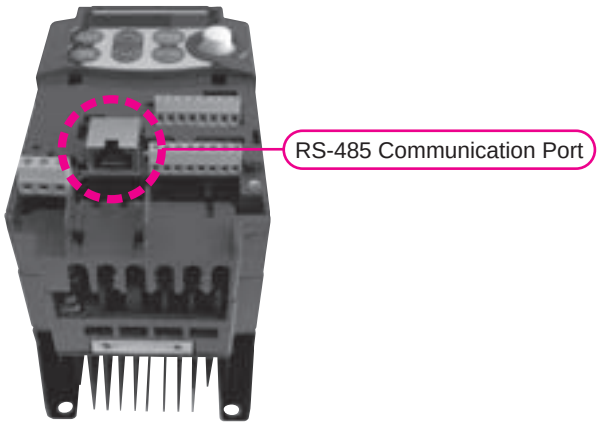
Synchronous Motor Control

Use of sensorless synchronous motor control together with the motor can reduce energy consumption

Network Capabilities

RS-485 Communications Port as Standard

Communications can be controlled through the standard RS-485 communications port using the Modbus-RTU or Fuji Electric inverter protocol



Other Features

Functions for User Applications

V/F (non-linear 3 step)
Two motor parameter sets
Brake signal (brake release signal)
Rotational direction control (prevent forward/reverse movement)

Global Standard

EC Directives (CE making) CE

UL standard (cUL certification) c UL US LISTED

Fuji Electric
Innovating Energy Technology

High Performance Inverter

FRENIC-Ace New

FRENIC Ace

FUJI ELECTRIC INVERTERS

The FRENIC-Ace Inverters are full feature drives offering great value and maintain high performance through optimal design for a wide range of applications for various machines and devices.

Trading : Engineering Design : Contactor : Service

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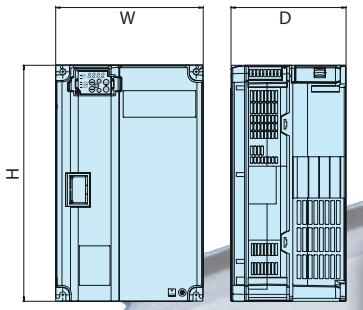
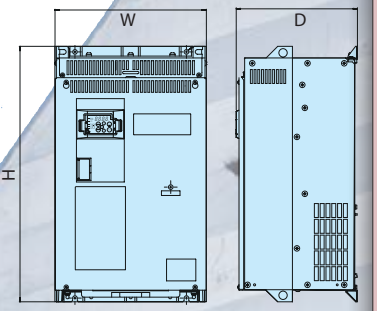
FRENIC Ace NEW

FRENIC-ACE is the inverter that produces excellent cost-performance with maintaining its high performance through optimal design. With the 200 steps of its customized logic as a standard feature, it enables users to customize their inverters from simple logistics function to full-scaled programming.

As a standard inverter for the next generation which can be applied to various machines and devices, FRENIC-Ace can be used in almost any type of application from fans and pumps up to specialized machines.

- Customizable logic (mini PLC, 200 steps), superior flexibility
- Quadruple rating from 18.5 kW to 220 kW
- CAN Open communications built-in as standard
- Wide variety of functions as a standard feature
- Safety enable input STO (compliant to EN/ISO13849-1, SIL3, Pl=e, cat. 3)
- 10 years lifetime design
- Optional multifunctional keypad
- Closed loop for IM and Sensorless PMSM control modes





External dimensions with built-in filter except for 5.5 to 15 kW

Power supply voltage	Applicable standard motor (kW)				Inverter model	Outside dimensions (mm)		
	HHD*	HND*	HD*	ND*		W	H	D
3-phase 400 VAC	0.4	0.75	-	-	FRN0002E2□-4□	110	140	162
	0.75	1.1	-	-	FRN0004E2□-4□			186
	1.5	2.2	-	-	FRN0006E2□-4□	140		199
	2.2	3.0	-	-	FRN0007E2□-4□			
	3.7	5.5	-	-	FRN0012E2□-4□			
	5.5	7.5	-	-	FRN0022E2□-4□	180	230	158
	7.5	11	-	-	FRN0029E2□-4□			
	11	15	-	-	FRN0037E2□-4□	220	270	190
	15	18.5	-	-	FRN0044E2□-4□			
	18.5	22	22	30	FRN0059E2□-4□	250	400	195
	22	30	30	37	FRN0072E2□-4□			
	30	37	37	45	FRN0085E2□-4□	326.2	550	261
	37	45	45	55	FRN0105E2□-4□			
	45	55	55	75	FRN0139E2□-4□	361.2	615	276
	55	75	75	90	FRN0168E2□-4□		675	
	75	90	90	110	FRN0203E2□-4□		740	
	90	110	110	132	FRN0240E2□-4□	536.4		321
	110	132	132	160	FRN0290E2□-4□			
	132	160	160	200	FRN0361E2□-4□		1000	366
	160	200	200	220	FRN0415E2□-4□			
	200	220	220	280	FRN0520E2□-4□	686.4		
	220	280	250	315	FRN0590E2□-4□			
1-phase 200 VAC	0.1	-	-	-	FRN0001E2□-7□	68	127	85
	0.2	-	-	-	FRN0002E2□-7□			
	0.4	-	-	-	FRN0003E2□-7□			107
	0.75	-	-	-	FRN0005E2□-7□			152
	1.5	-	-	-	FRN0008E2□-7□	110	130	153
	2.2	-	-	-	FRN0011E2□-7□	140		143

Note
3-phase 200 VAC available in a different type code.

* HHD: 150% 1 min, 200% 0.5 s / HND, ND: 120% 1 min / HD: 150% 1 min
Additional conditions:
· Temperature: at 40°C for HD and ND, at 50°C for HHD and HND
· Carrier frequency: at 4 kHz for HD, ND (from 72 till 168), at 6 kHz for HND (from 72 till 168), at 10 kHz for HHD (from 72 till 168), at 4 kHz for ND, HD, HND (from 203 till 590), at 6 kHz for HHD (from 203 till 590)
□ See type code explanations below.

TYPE CODE

FRN 0059 E2 S - 4 A

- FRN: Series name: FRENIC
- 0059: Applicable rated current at Normal Duty
- E2: Applied for: Ace
- S: Model: E: EMC filter built-in / S: Without EMC filter
- 4: Input power supply: 4: 3-phase 400 VAC / 2: 3-phase 200 VAC / 7: 1-phase 200 VAC (coming soon)
- A: Destination: A: Asia / GA: Global, with terminal block / GB: Global, without terminal block

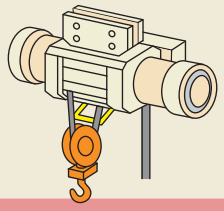
CE
c UL LISTED

Customizable Logic

Customizable logic function is available as a standard feature. FRENIC-Ace has built-in customizable logic functions with a maximum of 200 steps including both digital and analog operation functions, giving customers the ability to customize their inverters—from simple logic functions to full-scale programming. Fuji Electric also has plans to offer programming templates for wire drawing machines, hoists, spinning machines, and other applications so that the FRENIC-Ace can be used as a dedicated purpose inverter.

Example: Hoist crane application

Programming the FRENIC-Ace main unit with the required logic for controlling a hoist

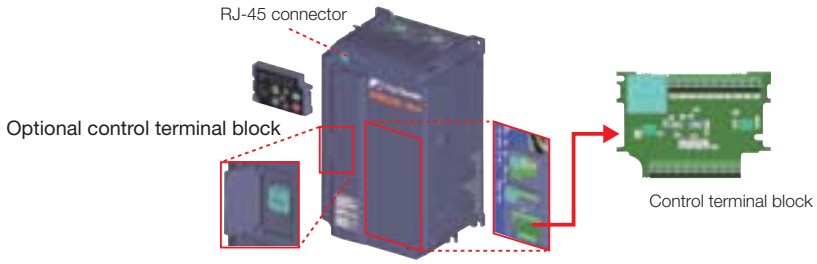
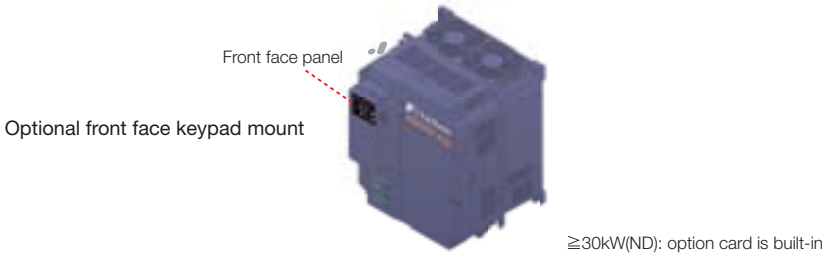


- (1) Set speed program
- (2) Reset the alarm by using the push-button switch
- (3) Mechanical limit switch function
- (4) Detect load
- (5) Automatic speed drive when no load is detected
- (6) Overload stop function

→ Dedicated/specialized functions for hoist application implemented by using customizable logic

Superior Flexibility

FRENIC-Ace has readily available interface cards and various types of fieldbus / network to maximize its flexibility.

Option	Installation type
RS485 communications card PG interface (5V) card PG interface (12/15V) card	
DeviceNet communication card CC-Link communication card PROFIBUS-DP communication card (Coming Soon) EtherNet/IP communication card (Coming Soon) ProfiNet-RT communication card (Coming Soon) CANopen communication card (Coming Soon) Digital input/output interface card Analog input/output interface card	

Wide Variety Of Functions As A Standard Feature

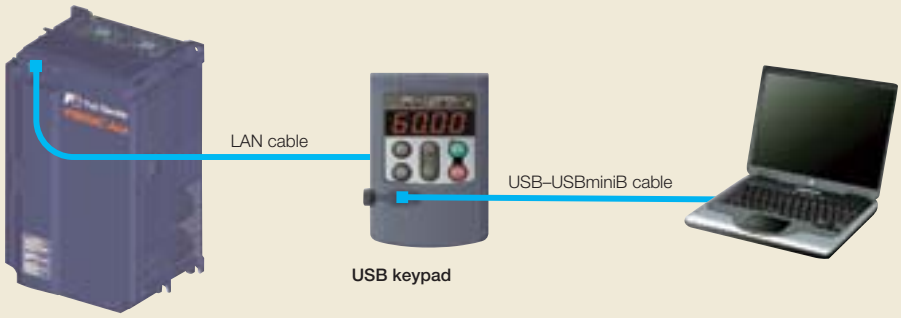
- Sensorless dynamic torque vector control
- Motor vector control with PG (with optional card)
- Synchronous motor with sensorless vector control
- 2-channel on-board RS485 communications port
- Standard CANopen compatibility
- Removable keypad device
- Removable control terminal block board

Multi-Function Keypad (option)

FRENIC-Ace has two different multi-function keypads available

- Multi-function keypad with LCD display: Enhanced HMI functionality
- USB keypad: Connect to a computer for more efficient operation (set-up, troubleshooting, maintenance, etc)

Multi-function keypad with LCD screen



Functional Safety

FRENIC-Ace is equipped with STO functional safety function as a standard. Therefore output circuit magnetic contactors are not required for safe stop implementation. Enhanced standard features position FRENIC-Ace ahead of its class (Safety input: 2CH, output: 1CH).

■Complies with (coming soon)

EN ISO 13849-1: 2008, Cat.3 / PL=e
IEC/EN 60204-1: 2005/2006 Stop category 0
IEC/EN 61508-1 to -7: 2010 SIL3
IEC/EN 61800-5-2: 2007 SIL3 (Safety feature: STO)
IEC/EN 62061: 2005 SIL3

10 Years Lifetime Design

FRENIC-Ace components have a design life of ten years.
A longer maintenance cycle also helps to reduce running costs.

Design life	Main circuit capacitor		10 years*
	Electrolytic capacitors on PCB		10 years*
	Cooling fan		10 years*
	Life conditions	Ambient temperature	+40°C
		Load rate	100% (HHD specifications) 80% (HND/HD/ND specifications)

* ND specifications have a rated current of two sizes higher than HHD specifications, so the life is 7 years.

Standards

■RoHS Directive

Standard compliance with European regulations that limit the use of specific hazardous substances (RoHS)

<Six hazardous substances>	Lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB), polybrominated biphenyl ether (PBDE)
<About RoHS>	Directive 2002/95/EC, issued by the European Parliament and European Council, limits the use of specific hazardous substances in electrical and electronic devices.

Global Compliance

■Standard compliance

EC Directives (CE Mark)

UL Standard (cUL Certified)

Fuji Electric
Innovating Energy Technology

High Performance Multifunctional Inverters

FRENIC-MEGA Series

FUJI INVERTERS

With the flexibility and functionality to support a wide range of applications on all types of mechanical equipment, the FRENIC-MEGA takes core capability, responsiveness, environmental awareness, and easy maintenance to the next level.

Trading : Engineering Design : Contactor : Service

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FRENIC MEGA

FRENIC-MEGA, which is the successor of former G11S series and named as a "Maximum Engineering for Global Advantage", is a high performance, multifunctional inverter Fuji Electric has developed by gathering the best of its technologies.

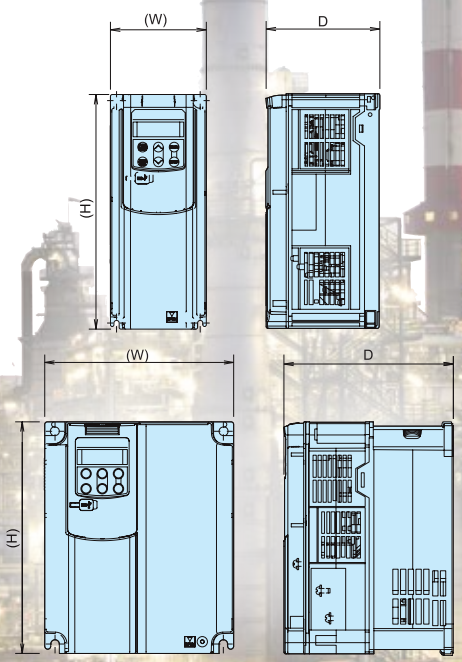
With the flexibility and functionality to support a wide range of applications on all types of mechanical equipment, FRENIC-MEGA takes core capability, responsiveness, environmental awareness, and easy maintenance to the next level.

- Safety enable input (compliant to EN/ISO13849- PL=d, cat. 3)
- Built-in EMC filter for all capacities (compliant to EN 61800-3, category C3)
- Sensorless vector control mode (100% torque at 0 Hz)
- Advanced PID functions (dancer control)
- Brake control function
- Logic gates for logic combination of input and output functions and delay timer (10 steps)
- Positioning function (when encoder option is used)
- 3 slots for 3 different options at the same time (encoder, fieldbus, I/O expansion)
- Removable control terminals (cage clamp type)
- External EMC filter (footprint up to 22 kW) for higher EMC compliance (EN 61800-3, category C2)
- Basic LED keypad with built-in USB port and copy function (1 complete function set, operation, maintenance and alarms information)
- Advanced LCD/LED keypad with clear text description and copy function (3 complete function sets)

Power supply voltage	Applicable standard motor (kW) HD*	Applicable standard motor (kW) LD*	Inverter model	Outside dimensions (mm) W	Outside dimensions (mm) H	Outside dimensions (mm) D
3-phase 400 VAC	0.4	-	FRN0.4G1□-4E	110	260	130
	0.75	-	FRN0.75G1□-4E			145
	1.5	-	FRN1.5G1□-4E	150		
	2.2	-	FRN2.2G1□-4E			
	4.0	-	FRN4.0G1□-4E			
	5.5	7.5	FRN5.5G1□-4E	220		195
	7.5	11	FRN7.5G1□-4E			
	11	15	FRN11G1□-4E			
	15	18.5	FRN15G1□-4E	250	400	
	18.5	22	FRN18.5G1□-4E			
	22	30	FRN22G1□-4E			
	30	37	FRN30G1□-4E	326.2	550	261.3
	37	45	FRN37G1□-4E			
	45	55	FRN45G1□-4E	361.2	615	276.3
	55	75	FRN55G1□-4E		675	
	75	90	FRN75G1□-4E		740	
	90	110	FRN90G1□-4E	535.8		321.3
	110	132	FRN110G1□-4E			
	132	160	FRN132G1□-4E	536.4	1000	366.3
	160	200	FRN160G1□-4E			
	200	220	FRN200G1□-4E	686.4		
	220	280	FRN220G1□-4E			
	280	315	FRN280G1□-4E		1400	445.5
	315	355	FRN315G1□-4E			
	355	400	FRN355G1□-4E	886.4		446.3
	400	500	FRN400G1□-4E			
	500	630	FRN500G1□-4E	1006	1550	505.9
	630	710	FRN630G1□-4E			

□

Protection Structure: E: EMC Filter built-in / S: Standard basic type
*HD: 150% for 1 min, 200% for 3.0 s / LD: 120% for 1 min



TYPE CODE

FRN 0.75 G1 E - 4 A

- FRN: Series name: FRENIC
- 0.75: Standard applicable motor capacity (kW)
- G1: Applied for: MEGA
- E: Model: E: EMC filter built-in / S: Without EMC filter
- 4: Input power supply: 4: 3-phase 400 VAC / 7: 1-phase 200 VAC
- A: Destination: A (Asia)

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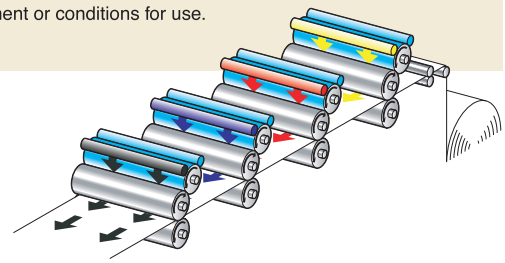
Best vector control for the general-purpose inverter in the class

Ideal for highly accurate control such as positioning

PG vector control

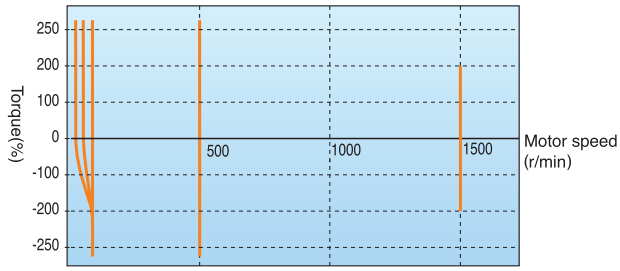
Effective in providing highly accurate control for applications such as printing press

Speed control range: 1:1500
Speed response: 100Hz
Speed control accuracy: ±0.01%
Current response: 500Hz
Torque accuracy: ±10%
* The option card is required separately.
* The above specifications may vary depending on the environment or conditions for use.



Fuji's original dynamic torque vector control has further evolved.

Besides the dynamic torque vector control, the inverter is equipped with the motor constant tuning for compensating even a voltage error of the main circuit devices and the magnetic flux observer of a new system. This realizes a high starting torque of 200% even at a low-speed rotation of 0.3Hz.



Example torque characteristics [5.5kW]

Improved durability in overload operation

The inverter performs short-time acceleration and deceleration with the maximum capacity by extending the time specification of overload current ratings compared with our previous models. This improves the operation efficiency of the equipment such as cutting machine or conveyance machine.
Overload durability: 200% for 3 sec and 150% for 1 min.

The standard model is available in two specifications concerning the operation load.

Classification	Overload current rating	Major use
HD (High duty) spec	200% for 3 sec, 150% for 1 min	Operation under heavy load
LD (Low duty) spec	120% for 1 min	Operation under light load

Expanded capacity for the braking circuit built-in type

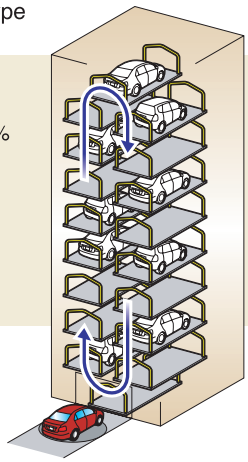
A braking circuit is built in the 22kW or smaller models as standard. These inverters are applicable to the machine that uses regenerative load such as a vertical conveyance machine.
(The 7.5kW or smaller models also incorporate a braking resistor.)
* The inverters with built-in braking circuit are available on request for 30kW to 110kW models in 400V series and 30kW to 55kW models in 200V series.

Maximizing the performance of a general-purpose motor

Speed sensor-less vector control (available soon)

Useful for the application that requires a high starting torque, such as the gondola type multi-level car parking tower

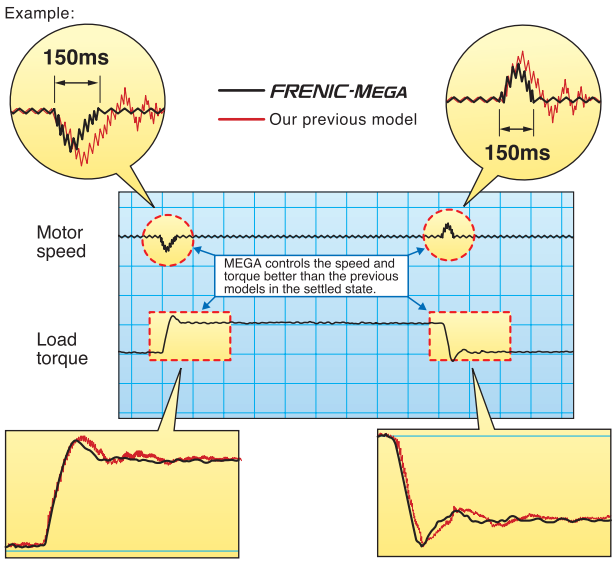
Speed control range: 1:200
Speed response: 20Hz
Speed control accuracy: ±0.5%
Current response: 500Hz
Torque accuracy: ±10%



Improved reaction to the fluctuation of impact load

When a remarkable load fluctuation occurs, the inverter provides the torque response in the class-top level. It controls the flux to minimize the fluctuation in the motor speed while suppressing the vibration. This function is best suited for the equipment that requires stable speed such as a cutting machine.

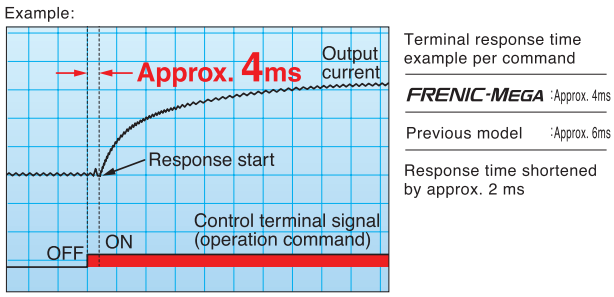
Example:



Quicker response to the operation commands

The terminal response to the operation commands has had an established reputation. FRENIC-MEGA has further shortened this response time, achieving the industry-top response time.
This function is effective in shortening the tact time per cycle and effective for use in the process including frequent repetitions.

Example:



Wide model variation meeting the customer needs

Wide model variation

1. Basic type

Suitable for the equipment that uses a peripheral device to suppress noise or harmonics.

2. EMC filter built-in type

By adopting built-in filter, this type is compliant with European EMC Directives category C3 (2nd Env) 'EN61800-3-2004'.

* Use of EMC filter will increase the leakage current.

Supports for simple maintenance

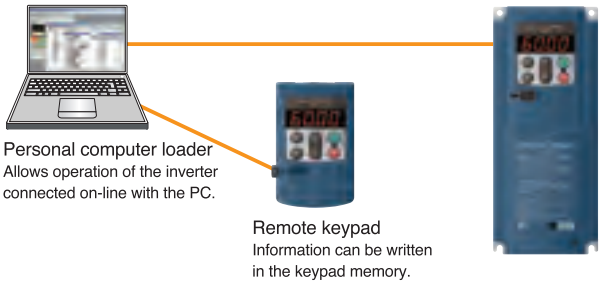
The built-in USB port allows use of a personal computer loader for easy information control!

Improved working efficiency in the manufacturing site

- A variety of data about the inverter body can be saved in the keypad memory, allowing you to check the information in any place.
- Data can be transferred from the USB port of the keypad directly to the computer (personal computer loader) in the manufacturing site.
- Periodical collection of life information can be carried out efficiently.
- The real-time tracing function permits the operator to check the equipment for abnormality.

Features

1. The keypad can be directly connected to the computer through a commercial USB cable (Mini B) without using a converter. The computer can be connected on-line with the inverter.
2. With the personal computer loader, the inverter can support the following functions (1) to (5).
   (1) Editing, comparing, and copying the function code data
   (2) Operation monitor, and real-time trace
   (3) Trouble history (indicating the latest four troubles)
   (4) Maintenance information
   (5) Historical trace (available soon)



Multi-function keypad is available (Optional) Type: OPC-G1-J1

Features

- Back-lighted LCD with higher view-ability
- A large 7-segment LED with 5-digit display
- Quick setup data item can be added/deleted.
- Remote/local switch key has been newly added.
- Max. 3 sets of data can be copied.
- Display languages:
  Japanese, English, German, French, Spanish, and Italian
  Another language version is also available for Japanese, English, Korean character, and simplified Chinese. Please contact us for details separately.

Fuji Electric
Innovating Energy Technology

High Performance Vector Control Inverter

FRENIC-VG Series

Trading : Engineering Design : Contactor : Service

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The Dawn of a New Era

The FRENIC-VG is creating a new era via the industry-leading performance.

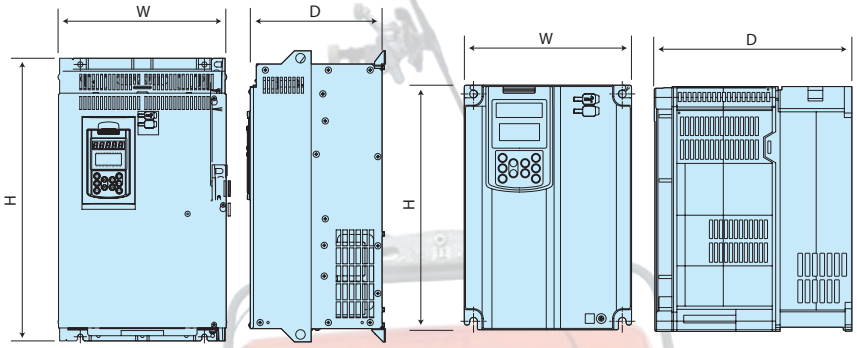
With the FRENIC-VG, Fuji has concentrated its technologies to deliver the best-performing inverter on the market. In addition to basic performance, this model features the following dramatic improvements: support for previously difficult applications due to technical and capability limitations, easier, more user-friendly maintenance, and environmental friendliness and safety. Fuji Electric proudly introduces the FRENIC-VG to the world.

FRENIC-VG unit type

With FRENIC-VG, Fuji Electric has concentrated its technologies to deliver the best-performing inverter on the market. In addition to its basic performance, this model features the following great improvements: support for previously difficult applications due to technical and capability limitations, easier and more user-friendly maintenance, as well as environmental friendliness and safety. With using its vector control, FRENIC-VG unit type will cover various applications which require powerful but also accurate performance.

- Powerful: from 0.75 kW to 630 kW in triple rating HD, LD and MD
- Strong: even though in hard environment such as sulfurizing gas, salty environments, dust, humidity, etc.
- Flexible: IM (open and closed loop) and PMSM (open* and closed loop) control
- Torque accuracy: +/- 3%
- Current loop bandwidth: 2000 Hz
- Speed control accuracy: +/- 0,005%
- Speed loop bandwidth: 600Hz
- Connected to the world: USB on board, typical field buses and Ethernet based field bus
- Making safety easier: STO, SS1, SLS, SBC
- All applications solved: Cranes, rubber, paper, winding, test benches, press, shipboard winch, flying shear, positioning, etc are included
- Adaptable and versatile: 5 slots for adjusting to the requirements, real time built in, FULL PLC on board optional, etc.

** coming soon*



Power supply voltage	Applicable standard motor (kW)			Inverter model	Outside dimensions (mm)		
	HD*	MD*	LD*		W	H	D
3-phase 400 VAC	3.7	-	-	FRN3.7VG1S-4E	205	300	245
	5.5	-	-	FRN5.5VG1S-4E			
	7.5	-	-	FRN7.5VG1S-4E			
	11	-	-	FRN11VG1S-4E	250	400	
	15	-	-	FRN15VG1S-4E			
	18.5	-	-	FRN18.5VG1S-4E			
	22	-	-	FRN22VG1S-4E			
	30	-	37	FRN30VG1S-4E	326.2	550	261.3
	37	-	45	FRN37VG1S-4E			
	45	-	55	FRN45VG1S-4E	361.2	615	276.3
	55	-	75	FRN55VG1S-4E		675	
	75	-	90	FRN75VG1S-4E		740	321.3
	90	110	110	FRN90VG1S-4E	536.4		
	110	132	132	FRN110VG1S-4E			
	132	160	160	FRN132VG1S-4E		1000	366.3
	160	200	200	FRN160VG1S-4E			
	200	220	220	FRN200VG1S-4E	686.4		
	220	-	280	FRN220VG1S-4E			
	280	315	355	FRN280VG1S-4E		1400	445.5
	315	355	400	FRN315VG1S-4E			
	355	400	450	FRN355VG1S-4E	886.4		446.3
	400	450	500	FRN400VG1S-4E			
	500	-	630	FRN500VG1S-4E	1006	1550	505.9
	630	-	710	FRN630VG1S-4E			

*200 VAC series: HD: 150% 1 min, 200% 3 s / LD: 120% 1 min
400 VAC series: HD: 150% 1 min, 200% 3 s / MD: 150% 1 min / LD: 120% 1 min

TYPE CODE

FRN 30 VG1 S - 4 A

- FRN — Series name: FRENIC
- 30 — Nominal applied motor capacity (kW)
- VG1 — Applied for: VG, series "1"
- S — S: Standard type
- 4 — Input power supply: 4: 3-phase 400 VAC; 2: 3-phase 200 VAC
- A — Destination: A: Asia

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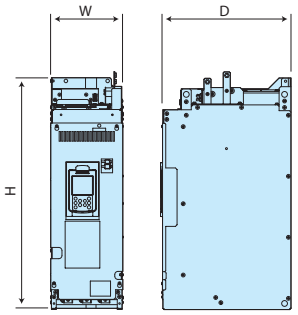
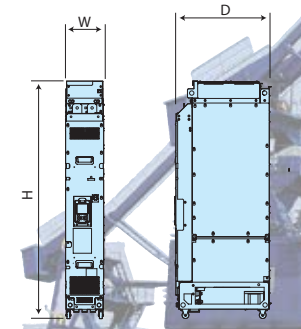
FRENIC-VG stack type

With FRENIC-VG, Fuji Electric has concentrated its technologies to deliver the best performing inverter on the market.
In addition to its basic performance, this model features the following great improvements: support for previously difficult applications due to technical and capability limitations, easier and more user-friendly maintenance, as well as environmental friendliness and safety. With using its parallel installation, FRENIC-VG stack type will cover various applications which require forceful performance.

- Powerful: from 30 kW to 3 MW in dual rating (MD/LD)
- Regenerative (converter) and non-regenerative (rectifier) headers from 132 kW to 3 MW
- Flexible: IM (open and closed loop) and PMSM (closed loop) control
- Easy to install
- Harmonic distortion mitigation: Sinusoidal-wave Regenerative Header, 12 pulses layout, etc.
- Taking the most benefits from DC bus link sharing: multiple possibilities of power layout
- Redundancy: possible to work at half power in case of maintenance or stack failure
- Non-stop function and other possibilities
- Making safety easier: STO, SS1, SLS, SBC
- 690 VAC series





Power supply voltage	No. of units	Applicable standard motor (kW) MD*	Applicable standard motor (kW) LD*	Inverter model	Outside dimensions (mm) W	Outside dimensions (mm) H	Outside dimensions (mm) D
3-phase 400 VAC	1	30	37	FRN30SVG1S-4E	226.2	740	406.3
		37	45	FRN37SVG1S-4E			
		45	55	FRN45SVG1S-4E			
		55	75	FRN55SVG1S-4E		880	
		75	90	FRN75SVG1S-4E			
		90	110	FRN90SVG1S-4E			
		110	132	FRN110SVG1S-4E		1100	567.3
		132	160	FRN132SVG1S-4E			
		160	200	FRN160SVG1S-4E			
		200	220	FRN200SVG1S-4E		1400	
		220	250	FRN220SVG1S-4E			
		250	280	FRN250SVG1S-4E			
		280	315	FRN280SVG1S-4E			
		315	355	FRN315SVG1S-4E			
		630	710	FRN630BVG1S-4E **	698.6		
		710	800	FRN710BVG1S-4E **			
		800	1000	FRN800BVG1S-4E **			
	2	355	400	FRN200SVG1S-4E	462.4	1100	567.3
		400	-	FRN220SVG1S-4E		1400	
		-	500	FRN250SVG1S-4E			
		500	630	FRN280SVG1S-4E			
		1000	1200	FRN630BVG1S-4E **	1367.2		
		1200	1200	FRN630BVG1S-4E **			
		-	1500	FRN710BVG1S-4E **			
		1500	1800	FRN800BVG1S-4E **			
	3	630	-	FRN220SVG1S-4E	698.6		
		-	710	FRN250SVG1S-4E			
		-	800	FRN250SVG1S-4E			
		710	-	FRN280SVG1S-4E			
		800	-	FRN280SVG1S-4E			
		-	1000	FRN315SVG1S-4E			
		1800	2000	FRN630BVG1S-4E **	2055.8		
		2000	2400	FRN710BVG1S-4E **			
		2400	1800	FRN800BVG1S-4E **			
3-phase 690 VAC (NEW)	1	90	110	FRN90SVG1S-69E	226.2	880	406.3
		110	132	FRN110SVG1S-69E			
		132	160	FRN132SVG1S-69E		1100	567.3
		160	200	FRN160SVG1S-69E			
		200	220	FRN200SVG1S-69E		1400	
		250	280	FRN250SVG1S-69E			
		280	315	FRN280SVG1S-69E			
		315	355	FRN315SVG1S-69E			
		355***	400***	FRN355SVG1S-69E			
		400***	450***	FRN400SVG1S-69E			
		450***	-	FRN450SVG1S-69E			

* MD: 150% 1 min / LD: 110% 1 min
** One set of the inverter consists of three stacks. The touch panel is connected to the V phase only.
*** Equipped with SiC hybrid module

TYPE CODE

FRN 30 S VG1 S - 4 A

- FRN: Series name: FRENIC
- 30: Nominal applied motor capacity (kW)
- S: Form: S: Standard stack / B: Stack phase / None: Unit type
- VG1: Applied for: VG, series "1"
- S: S: Standard type
- 4: Input power supply: 4: 3-phase 400 VAC, 69: 3-phase 690 VAC
- A: Destination: A: Asia

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Fuji Electric
Innovating Energy Technology

Low voltage AC drives for HVAC applications

FRENIC-HVAC

Smile to the Environment

HVAC

High performance enabled by the comprehensive use of Fuji technology. Easy maintenance for the end-user.Maintains safety and protects the environment.Opens up possibilities for the new generation.

Trading : Engineering Design : Contactor : Service

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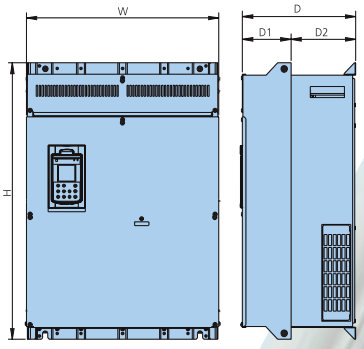
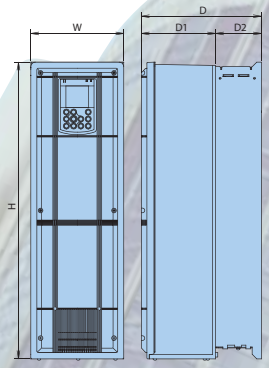
FRENIC-HVAC

FRENIC-HVAC is the first slim type inverter from Fuji Electric and dedicated to a variety of HVAC applications. This new series follows European trends with keeping high Japanese reliability.

Specific functions to manage fan and compressor applications and new energy saving functions are installed as standard and positioning FRENIC-HVAC as a high performance inverter on the HVAC and compressor market.

- Wide capacity range from 0.75 kW to 710 kW
- IP21 & IP55 with same dimension
- DCR and EMC filter built-in up to 90 kW. Built-in EMC filter for all capacities
- Overload capability 110%
- Torque Vector Control
- Modbus RTU, BACnet MS/TP,
- Metasys N2; integrated as standard
- Large LCD display, 19 languages + user customizable language
- Specific macros for common fan and compressor applications
- Customizable Logic (mini PLC), 14 steps, possibility to manage digital and also analog signals Real Time Clock (RTC)
- 4PID sets
- Unit conversion function (kPa, bar, l/min, etc.)
- Fire mode (forced operation) Catch spinning motor
- Password function
- Extension cable for remote operation (CB-…S)
- Battery (OPK-BP)





Power supply voltage	Applicable standard motor (kW)	Inverter model	Outside dimensions (mm)				
			W	H	D	D1	D2
3-phase 400V	0.75	FRN0.75AR1□-4E	150	465	262	162	100
	1.5	FRN1.5AR1□-4E					
	2.2	FRN2.2AR1□-4E					
	4.0	FRN4.0AR1□-4E					
	5.5	FRN5.5AR1□-4E					
	7.5	FRN7.5AR1□-4E					
	11	FRN11AR1□-4E	203	585			
	15	FRN15AR1□-4E					
	18.5	FRN18.5AR1□-4E					
	22	FRN22AR1□-4E					
	30	FRN30AR1□-4E	203	645			
	37	FRN37AR1□ -4E					
	45	FRN45AR1□ -4E	265	736	284	184	
	55	FRN55AR1□ -4E					
	75	FRN75AR1 □-4E	300	885	368	241	127
	90	FRN90AR1 □-4E					
	110	FRN110AR1S-4E	530	740	315	135	180
	132	FRN132AR1S-4E					
	160	FRN160AR1S-4E		1000	360	180	
	200	FRN200AR1S-4E					
	220	FRN220AR1S-4E	680				
	280	FRN280AR1S-4E					
	315	FRN315AR1S-4E		1400	440	260	
	355	FRN355AR1S-4E					
	400	FRN400AR1S-4E					
	500	FRN500AR1S-4E	880				
	630	FRN630AR1S-4E	1000	1550	500	313	187
	710	FRN710AR1S-4E					

□Protective structure: M: IP21, L: IP55. Type of frame: up to 37 kW plastic enclosure, 45 kW and above metal enclosure.

TYPE CODE

FRN 0.75 AR1 M - 4 A

- FRN — Series name: FRENIC
- 0.75 — Standard applicable motor capacity (kW)
- AR1 — Applied for: HVAC
- M — Protection Structure: S: IP00 M: IP21 L: IP55
- 4 — Input power supply: 4: 3-phase 400 VAC
- A — Destination: A (Asia)

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Optimum Control for HVAC Facilities

• Cooling tower fan

The cooling tower fan is used to cool the heat of cooling water by emitting it into the air. The fan speed is adjusted optimally according to the cooling water temperature at the outlet. Moreover, the inverter estimates the wet-bulb temperature automatically to control the fan so that the temperature of cooling water (wet bulb) is interlocked to the air temperature. (Wet-bulb temperature presumption control)

• Cooling water pump

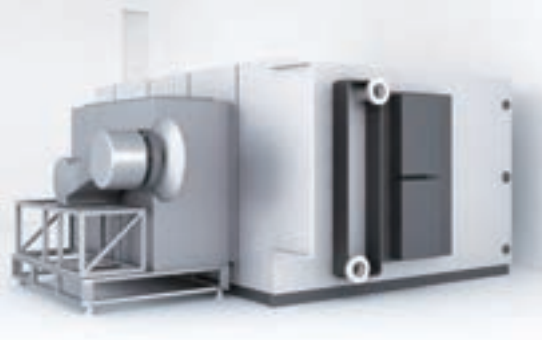
The cooling water pump circulates the cooling water to the cooling tower in order to cool the heat generated by the Refrigeration machine. The pump speed is adjusted optimally according to the temperature and flow rate of cooling water. Moreover, the inverter can control the cooling pump so that the difference of cooling water temperature at between the inlet and outlet becomes always constant. (Temperature difference constant control)

• Chilled water pump

The chilled water pump circulates the chilled water generated with the Refrigeration machine to the air conditioner and fan coil. The pump speed is adjusted optimally according to the header pressure. Moreover, the pump conveyance pressure can be controlled to proper value by converting the flow rate signal to the target pressure using the linearization function. (Linearization function)

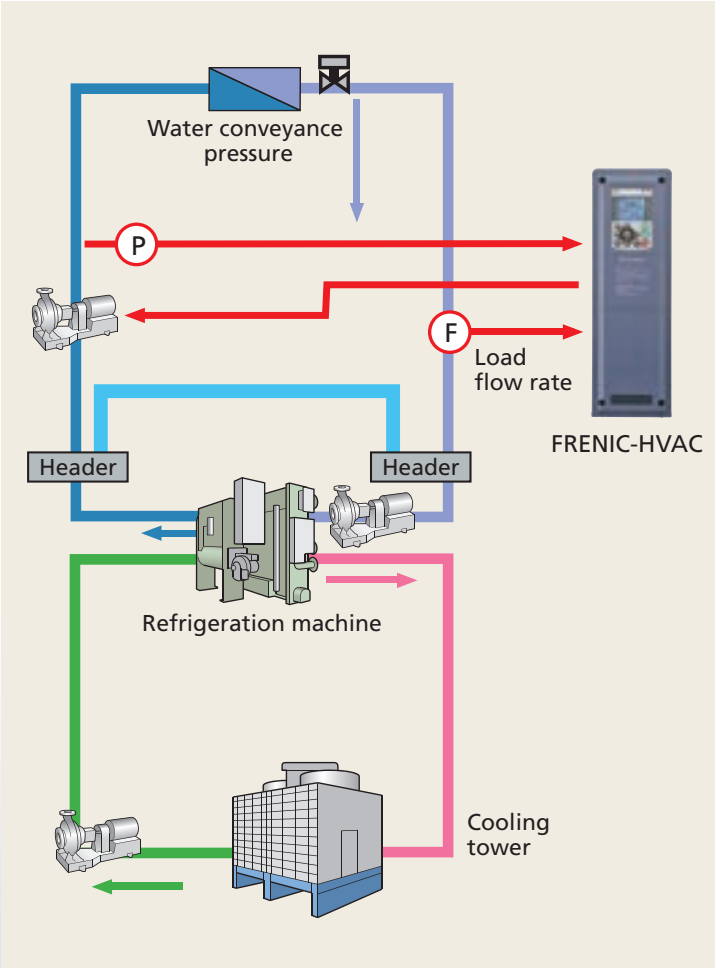
• Supply fan / Return fan

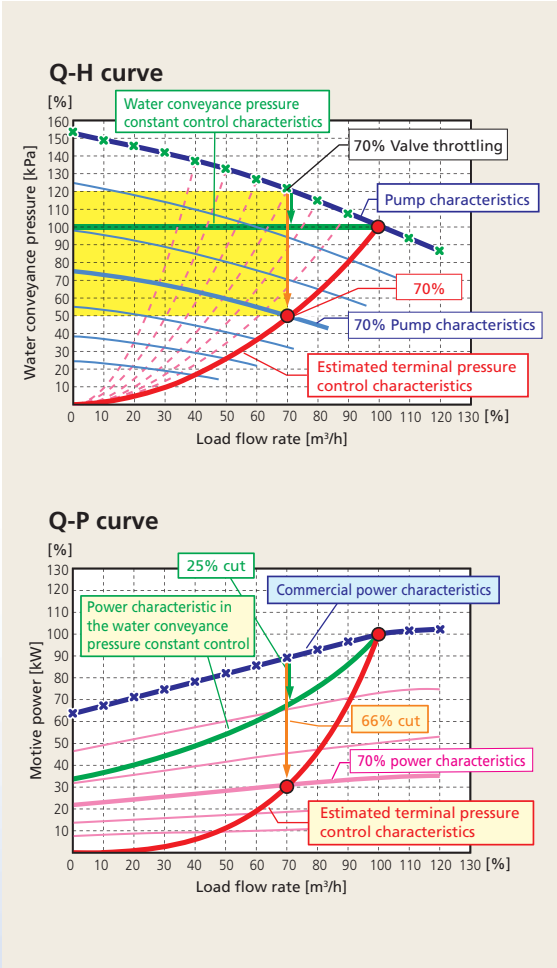
The speed of supply and return fans is adjusted optimally according to the pressure, discharge temperature, room temperature, and others. Moreover, the highest level of carbon dioxide is selected automatically by detecting the level in room to control it to stay within the allowable level.



Linearization function

This function estimates the target pressure using the load flow rate, which allows the estimated terminal pressure to be controlled.
For an air-conditioning heat source system, the needed quantity of the cooling or heating water fluctuates generally in seasons or days and nights. Therefore, operations continuing in a water conveyance pressure constant control may lead to high operating unnecessary pressures on terminals at low operating state. Thus, the pump consumes an ineffectual electric power for maintaining the high water conveyance pressure.
Based on the calculated value and water conveyance pressure of estimated terminal pressure using the detected load flow rate, PID control is performed.
It is possible to reduce the ineffectual pump power consumption and to achieve a great energy-saving effect together with maintaining comfortable current air conditioning.





Fuji Electric
Innovating Energy Technology

Low Voltage AC Drives for HVAC Applications

FRENIC-eHVAC

Efficient for Ecology

"eHVAC"

eHVAC High performance enabled by the comprehensive use of Fuji technology.
Easy maintenance for the end-user.Maintains safety and protects the environment.Opens up possibilities for the new generation.

Trading : Engineering Design : Contactor : Service

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FRENIC-eHVAC helps bring you the energy-savings you require with optimum control of HVAC applications. It is the optimum product for the control of fans and pumps such as supply and exhaust fans and water supply pumps for HVAC devices such as AHUs (air handling units), chillers, and cooling towers.

Features

Pursuit of cost competitiveness
Competitiveness realized with optimum design.

Dedicated functionality for HVAC markets
Fire mode (fan control), built-in PID/Cascade operation (pump control), etc.

Built-in EMC filter as standard
Built-in category C2/C3 EMC filter as standard, catering for a variety of environments.

PM motor drive possible
PM motor drive is now possible with PM sensorless vector control.

Enhanced customized logic
Equipped with customized logic as standard to facilitate the free programming of up to 200 steps.
Unique functions tailored to the application or usage method can constructed.

Comprehensive communication support
Equipped with BACnet communication protocol as standard to facilitate the productization of a variety of control and communication options.
Construction of system support is made easy with these functions.

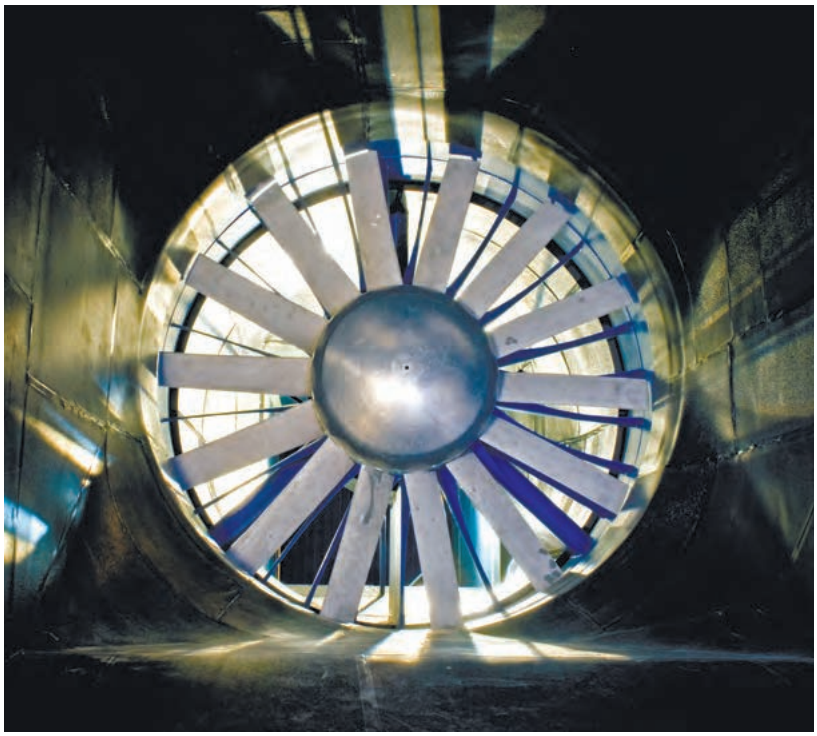
- Standard support: RS485, Modbus RTU, BACnet MS/TP
- Option support: Profibus DP, DeviceNet, Lonworks, CC-Link

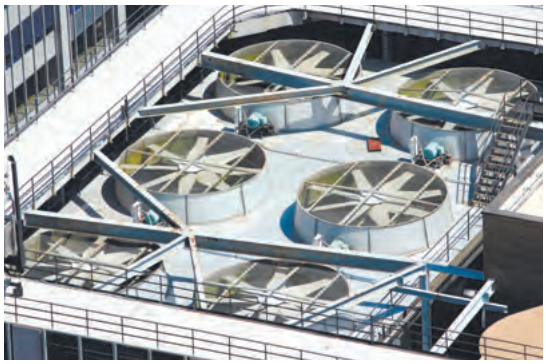
Multi-function keypad (option)
A multi-function keypad with support for 19 languages is available as an option to realize worldwide deployment.

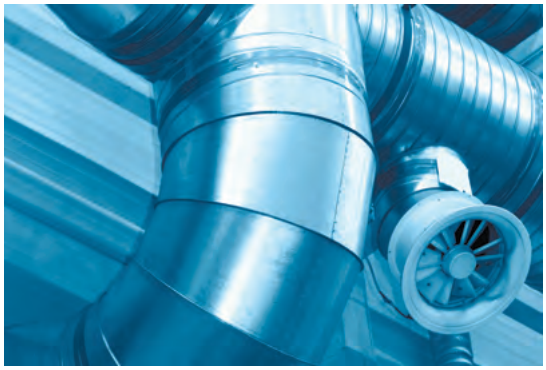
HVAC application examples

FRENIC-eHVAC plays a vital role in a variety of HVAC applications, helping to make all our lives that little bit easier.

VENTILATION







AIR CONDITIONING

PUMPING

Fuji Electric
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Low voltage AC drives for water, wastewater & irrigation applications

FRENIC-AQUA

Smile to the Environment

AQUA

High performance enabled by the comprehensive use of Fuji technology.
Easy maintenance for the end-user.Maintains safety and protects the environment.Opens up possibilities for the new generation.

Trading : Engineering Design : Contactor : Service

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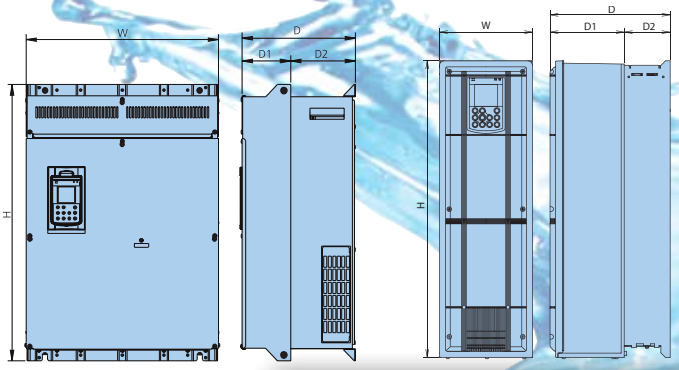
FRENIC-AQUA

FRENIC-AQUA is the first slim type inverter from Fuji Electric and dedicated to a variety of applications of water supply and wastewater treatment systems.

This new series follows European trends with keeping high Japanese reliability. Specific functions to prevent damage on the systems and new energy saving functions are installed as standard and positioning FRENIC-AQUA as a high performance inverter on the pumping application market.

- Wide capacity range from 0.75 kW to 710 kW
- IP21 & IP55 with same dimension
- DCR and EMC filter built-in up to 90 kW. Built-in EMC filter for all capacities
- Overload capability 110%
- Torque Vector Control
- Battery (OPK-BP)
- Modbus RTU, BACnet MS/TP, Metasys N2; integrated as standard
- Large LCD display, 19 languages + user customizable language
- Specific macros for common pump applications
- Customizable Logic (mini PLC), 14 steps, possibility to manage digital and also analog signals
- Real Time Clock (RTC)
- 4 PID Sets
- Unit conversion function (kPa, bar, l/min, etc.), Fire mode (forced operation)
- Password function
- New energy saving functions (sleep mode)
- Multipump control (up to 9 pumps with one inverter)
- Anti jam function
- Pipe fill mode
- Extension cable for remote operation (CB-…S)



Power supply voltage	Applicable standard motor (kW)	Inverter model	Outside dimensions (mm)				
			W	H	D	D1	D2
3-phase 400 VAC	0.75	FRN0.75AQ1□-4E	150	465	262	162	100
	1.5	FRN1.5AQ1□-4E					
	2.2	FRN2.2AQ1□-4E					
	4.0	FRN4.0AQ1□-4E					
	5.5	FRN5.5AQ1□-4E					
	7.5	FRN7.5AQ1□-4E					
	11	FRN11AQ1□-4E	203	585			
	15	FRN15AQ1□-4E					
	18.5	FRN18.5AQ1□-4E					
	22	FRN22AQ1□-4E					
	30	FRN30AQ1□-4E	203	645			
	37	FRN37AQ1 □-4E					
	45	FRN45AQ1 □-4E	265	736	284	184	
	55	FRN55AQ1 □-4E					
	75	FRN75AQ1 □-4E	300	885	368	241	127
	90	FRN90AQ1 □-4E					
	110	FRN110AQ1S-4E	530	740	315	135	180
	132	FRN132AQ1S-4E					
	160	FRN160AQ1S-4E		1000	360	180	
	200	FRN200AQ1S-4E					
	220	FRN220AQ1S-4E	680				
	280	FRN280AQ1S-4E					
	315	FRN315AQ1S-4E		1400	440	260	
	355	FRN355AQ1S-4E					
	400	FRN400AQ1S-4E					
	500	FRN500AQ1S-4E	880				
	630	FRN630AQ1S-4E	1000	1550	500	313	187
	710	FRN710AQ1S-4E					

□Protective structure: M: IP21, L: IP55. Type of frame: up to 37 kW plastic enclosure, 45 kW and above metal enclosure.

TYPE CODE

FRN 0.75 AQ1 M - 4 A

- FRN: Series name: FRENIC
- 0.75: Standard applicable motor capacity (kW)
- AQ1: Applied for: AQUA
- M: Protection Structure: S: IP00 M: IP21 L: IP55
- 4: Input power supply: 4: 3-phase 400 VAC
- A: Destination: A (Asia)

CE

c UL LISTED

Optimal Structure Design

User friendly, easy to see keypad

- The regulator is indicated by enlarging the LCD.

1. Present value (PV)
2. Setting value (SV)
3. Manipulating value (MV)
4. Frequency
5. Output current
6. Output voltage
7. Torque
8. Rotation speed
9. Power consumption
10. Cumulative energy

*Possible to show understandable indications through the unit conversion function.
*Multi-language function: 19 languages + user customized language supported

- Multi-language supported: 19 languages + user customized language (Planned)

Language				
Japanese	English	Chinese	German	French
Spanish	Italian	Russian	Greek	Turkish
Malay	Vietnamese	Thai	Indonesian	Polish
Czech	Swedish	Portuguese	Dutch	

Real time clock (RTC) is provided as standard.

- Alarm information with date and time
  - Alarm information for last ten times is stored and displayed with date and time.

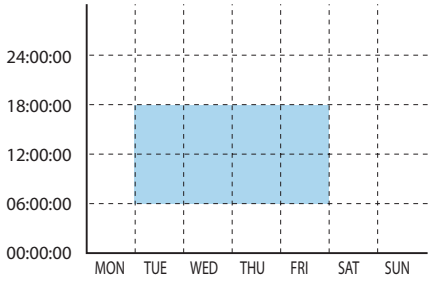
Easy failure analysis

- Timer function
  - Possible to set the maximum four timers for a week.
  - Possible to set flag holidays (20 days a year).

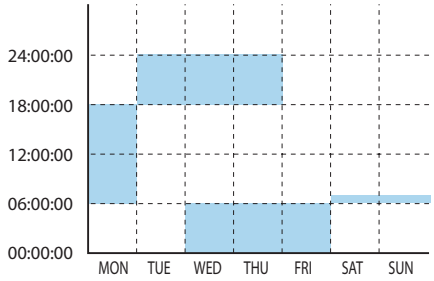
Operation schedule can be set according to actual condition by using four timers.

Example

When operation is performed in the same schedule through a week



When operation schedule varies depending on the day of the week



- Unit conversion function between PV and SV values
  - Unit conversion allows you to easily set data.

Function	Units			
Unit conversion	No conversion	%	RPM	l/min
	m^3/h	˚C	mbar	bar
	kPa	mWG	mmHg	kW
	in-wg	psi	˚F	ppm
	PSI			

1 User-friendly, easy to see dedicated keypad

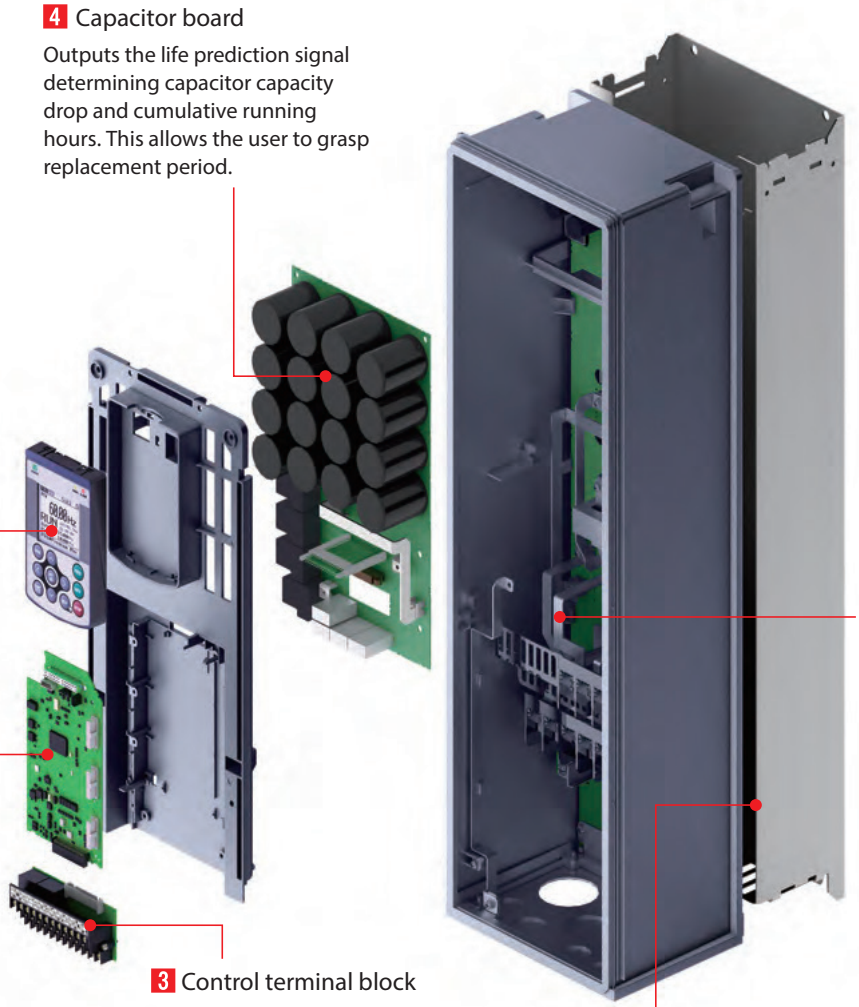
Multi-language supported, HELP function featured, unit setting with SV and PV values, data copy (three kinds), detachable and can be attached on the panel (using an optional cable)

5 Cooling fan

Easy replacement just by simply removing and attaching the part. Life prolongation is possible by controlling ON and OFF.

4 Capacitor board

Outputs the life prediction signal determining capacitor capacity drop and cumulative running hours. This allows the user to grasp replacement period.



6 EMC filter

Drastically reduces noise. Provided to units of all capacities. Conforming to IEC61800-3.

3 Control terminal block

The detachable control terminal block is adopted. This allows the unit to be replaced easily without disconnecting cables.

7 DCR

Drastically reduces harmonic noise. Conforming to IEC/EN61000-3-2 and IEC/EN61000-3-12. Provided as standard (to models up to 90kW), and can be attached externally as an option (to models from 110kW to 710kW).

2 Control board

USB port equipped, BACnet equipped as standard.
Max. three types of built-in optional boards can be mounted all together.
Optional battery connection
Various communications options

Standard equipment	Optional equipment	
· BACnet MS/TP	· LonWorks	· DeviceNet
· Modbus RTU	· Ethernet	· CANopen
· Metasys N2	· Profi bus	· CC-Link

8 Environmental immunity

3C2, IEC60721-3-3 supported

9 Others

Support/analysis software by loader, RTC backup by battery (option)

Fuji Electric
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Fuji Medium-voltage IGBT Inverters

FRENIC4600FM5e

AC Adjustable Speed Drive

Trading : Engineering Design : Contactor : Service

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FRENIC4600FM5e

Medium Voltage Inverter

FRENIC4600FM5e

- 250 kW to 9 000 kW
- 3.0 kV to 11 kV
- Asynchronous motors
- Air cooled
- 24-60 pulse (Low Harmonic)
- LV IGBT - Multi Level Topology
- Suitable for old & new motors
- Low parts count
- *MTBF ≥ 500.000 h !*
- User Friendly
- Global Network
- Japanese High Quality Design
- 3 Level Power Cell Technology
- No Output Filter Needed
- Sinusoidal Output
- Globally Installed Drives >1500

FRN46 - 4 F A - 60 5 60 - 1000 A

- Series: FRENIC4600FM5e
- Control method:
  F: Variable torque, V/f constant, simple speed sensor-less vector control
  S: Constant torque, speed sensor-less vector control
  V: Constant torque, vector control with speed sensor
- Input voltage:
  30: 3.0 kV / 33: 3.3 kV / 42: 4.16 kV /
  60: 6.0 kV / 66: 6.6 kV / X0: 10 kV / X1: 11 kV
- Input frequency: 5: 50 Hz / 6: 60 Hz
- Output voltage:
  30: 3.0 kV / 33: 3.3 kV / 42: 4.16 kV /
  60: 6.0 kV / 66: 6.6 kV / X0: 10 kV / X1: 11 kV
- Output capacity:
  0275 - 0980: 275 - 980 kVA /1000 - 9500: 1000 - 9500 kVA / X500: 10500 kVA
- Auxiliary power:
  A: Control power: 1-phase 220 VAC, fan power: 3-phase 380 VAC Z: Other

Environment-friendly inverters.

Fuji medium-voltage IGBT inverter FRENIC4600FM5e is used for direct variable-speed control of medium-voltage motors, and greatly raises the efficiency and power factor, stabilizes motor operation and conserves energy.

Compact design for space saving

- The industry's smallest-class inverter achieved by significant panel size reduction

Ideal inverter for power sources and motors

- The multi-phase diode rectifier system reduces harmonics on the power source side.
- Due to the use of Fuji Electric's unique multi-level PWM control system, the switching surge is reduced and existing motors (standard ones) can be operated.

High-efficiency and high-power factor

- The use of a multi-phase diode, full-wave rectifier provides a high-power factor (95% or more) on the power source.
- The elimination of output transformers for operation has improved total efficiency (approx. 97%).
- Fuji Electric's original multi-level PWM control has reduced the IGBT switching loss.

FRENIC4600FM5e

10kV 1,200kVA

High-reliability

- Higher equipment reliability is achieved by reducing the number of inverter cells by using a single-phase, 3-level inverter, etc..
- Stable operation is maintained despite load fluctuations, by the simple sensor-less vector control function.
- The control device has a 32-bit MPU for quick response and high-accuracy.

Contributes to energy saving

- A substantial energy saving is achieved by variable-speed control of a square-law reduced torque load such as a fan or pump.

Vector control (option)

- Vector control with a speed sensor is available (as an option) for equipment having high speed and torque accuracy requirements.

Easy maintenance

- The inverter is air-cooled, requiring no cooling water.
- Start/stop operation, parameter setting, fault display and data monitoring are performed from the touch panel with simple loader functions.
- Simple, built-in auto-tuning functions facilitate testing and adjustment.
- Fault diagnoses are easily performed.
- A dry-type input transformer is adopted.

Fuji Electric

Innovating Energy Technology

ALPHA5 Smart

Trading : Engineering Design : Contactor : Service

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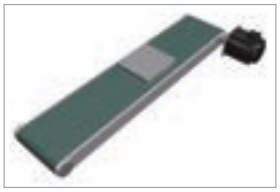
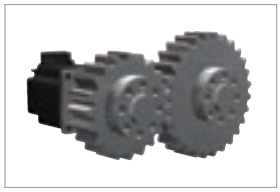
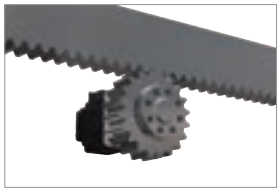
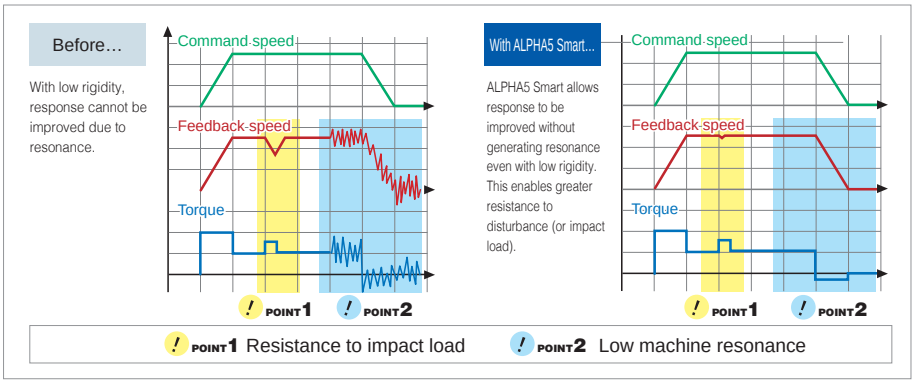
Features

Feature 1 | Wide Range of Applications

With the new auto-tuning function, optimal tuning can be realized even for low-rigidity devices!!

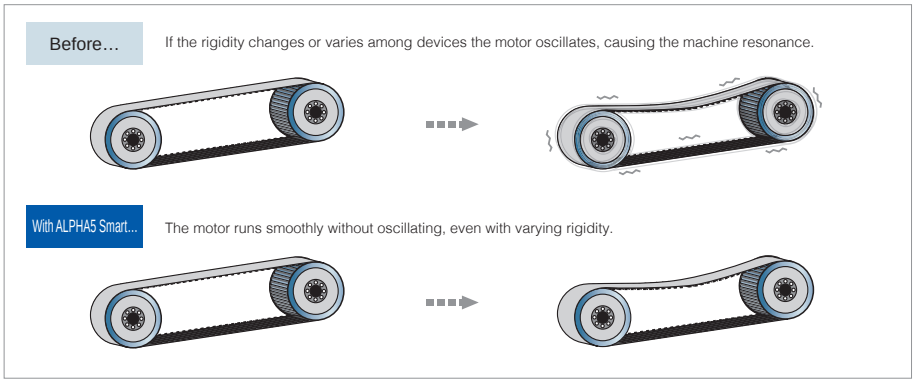




Easy adjustment even for long belt mechanisms, gears with considerable backlash, and rack and pinion mechanisms.



Feature 2 | Super Stability

Smooth, stable operation even with changes due to wear or variation* among devices.



* Variations in device rigidity such as belt tension or parts.

Other Features

Smart Operation

New handy-sized portable servo operator makes the operation much smarter

Long-life design

Electrolytic capacitor 10years

Cooling fan 10years

* Operating conditions
- Ambient temperature: Average 30°C/year
- Load factor: Within 80%
- Operation rate: Within 20 hours/day

Easy ABS battery replacement

ABS backup battery can be mounted on front face of servo amplifier for easy replacement

Regulatory compliance

Global Compatibility.The standard model complies with CE marking, UL/cUL and TÜV.

RoHS Directive

Compliant with the European Restriction of Hazardous Substances (ROHS) Directive. The use of six hazardous substances has been reduced for a more environmentally-friendly servo system.
<Six hazardous materials>
Lead, mercury, cadmium,hexavalent chromium, polybrominated biphenyl (PBB), polybrominated diphenylether (PBDE)

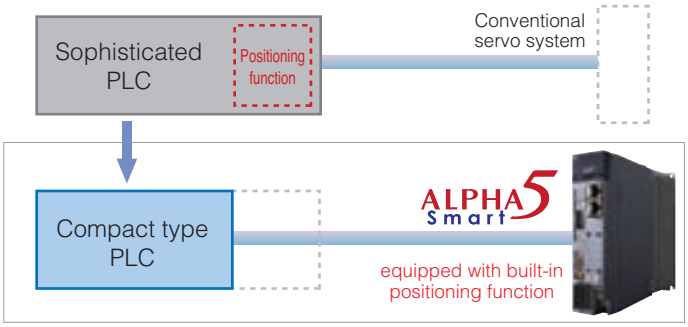
Features

Feature 3 | Smart Design

PTP positioning

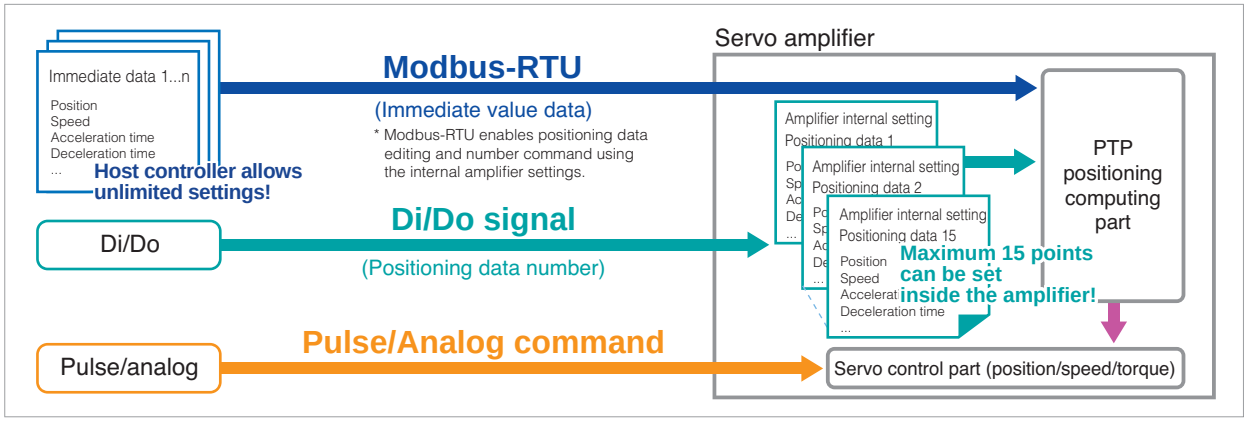
Positioning function built in as standard

No external units or special equipment required for positioning



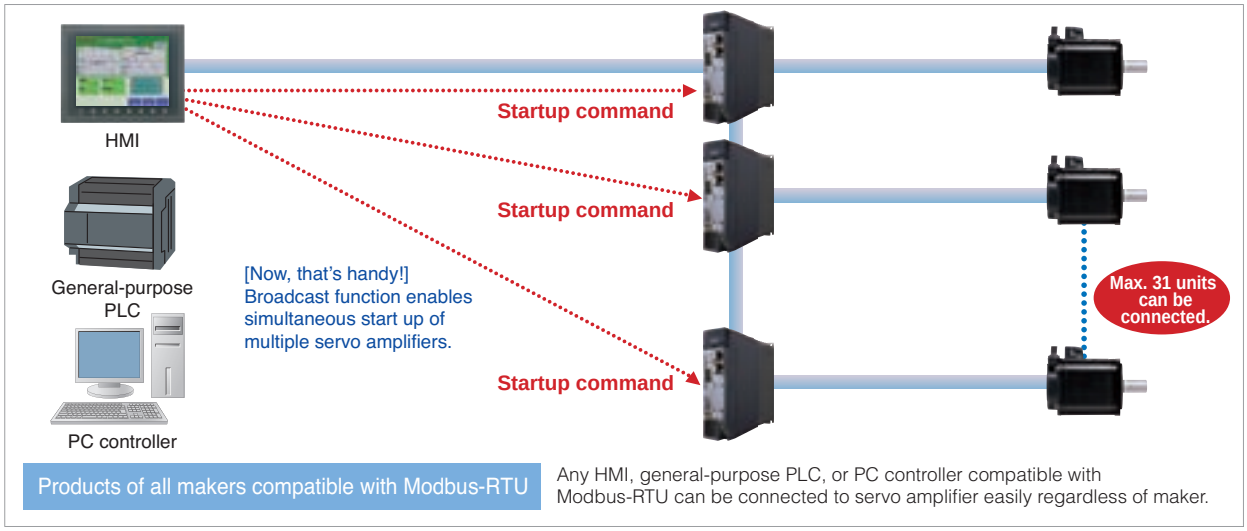
3-in1 functionality

Three operations via one unit:
- Positioning via Modbus-RTU communications (immediate value data)
- Positioning via Di/Do signal (positioning data 15 points*)
- Position, speed, and torque control via pulse/analog input



Simple operation via Modbus-RTU communications

Modbus-RTU communications enables PTP positioning, parameter editing, and the use of various monitors. Just connect an HMI, general-purpose PLC, or PC controller directly to the servo amplifier.



Product Family

Servo Amplifier / Motor

Inertia		Middle				Ultra-low
Applicable Motor / Servo Amplifier	Applicable motor output	GYB Motor 3000 [r/m] Brake: without (with)	GYH Motor 2000 [r/min] Brake: without (with)	GYG Motor 2000 [r/min] Brake: without (with)	GYG Motor 1500 [r/min] Brake: without (with)	GYS Motor 3000 [r/min] Brake: without (with)
RYH201F5-VV2	0.05kW					GYS500D5-□□2 (-B)
	0.1kW					GYS101D5-□□2 (-B)
	0.2kW	GYB201D5-□□2 (-B)				GYS201D5-□□2 (-B)
RYH401F5-VV2	0.4kW	GYB401D5-□□2 (-B)				GYS401D5-□□2 (-B)
RYH751F5-VV2	0.5kW			GYG501C5-□□2 (-B)	GYG501B5-□□2 (-B)	
	0.75kW	GYB751D5-□□2 (-B)		GYG751C5-□□2 (-B)		GYS751D5-□□2 (-B)
	1.0kW		GYH102C6-TC2 (-B)			
RYH152F5-VV2	0.85kW				GYG851B5-□□2 (-B)	
	1.0kW			GYG102C5-□□2 (-B)		GYS102D5-□□2 (-B)
	1.5kW		GYH152C6-TC2 (-B)	GYG152C5-□□2 (-B)		GYS152D5-□□2 (-B)
	2.0kW		GYH202C6-TC2 (-B)			
RYH202F5-VV2	1.3kW				GYG132B5-□□2 (-B)	
	2.0kW			GYG202C5-□□2 (-B)		GYS202D5-□□2 (-B)
	3.0kW		GYH302C6-TC2 (-B)			
RYH302F5-VV2	3.0kW					GYS302D5-□□2 (-B)
	4.0kW		GYH402C6-TC2 (-B)			
RYH402F5-VV2	4.0kW					GYS402D5-□□2 (-B)
	5.5kW		GYH552C6-TC2 (-B)			
RYH502F5-VV2	5.0kW					GYS502D5-□□2 (-B)
	7.0kW		GYH702C6-TC2 (-B)			

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FALDIC ALPHA5

Trading : Engineering Design : Contactor : Service

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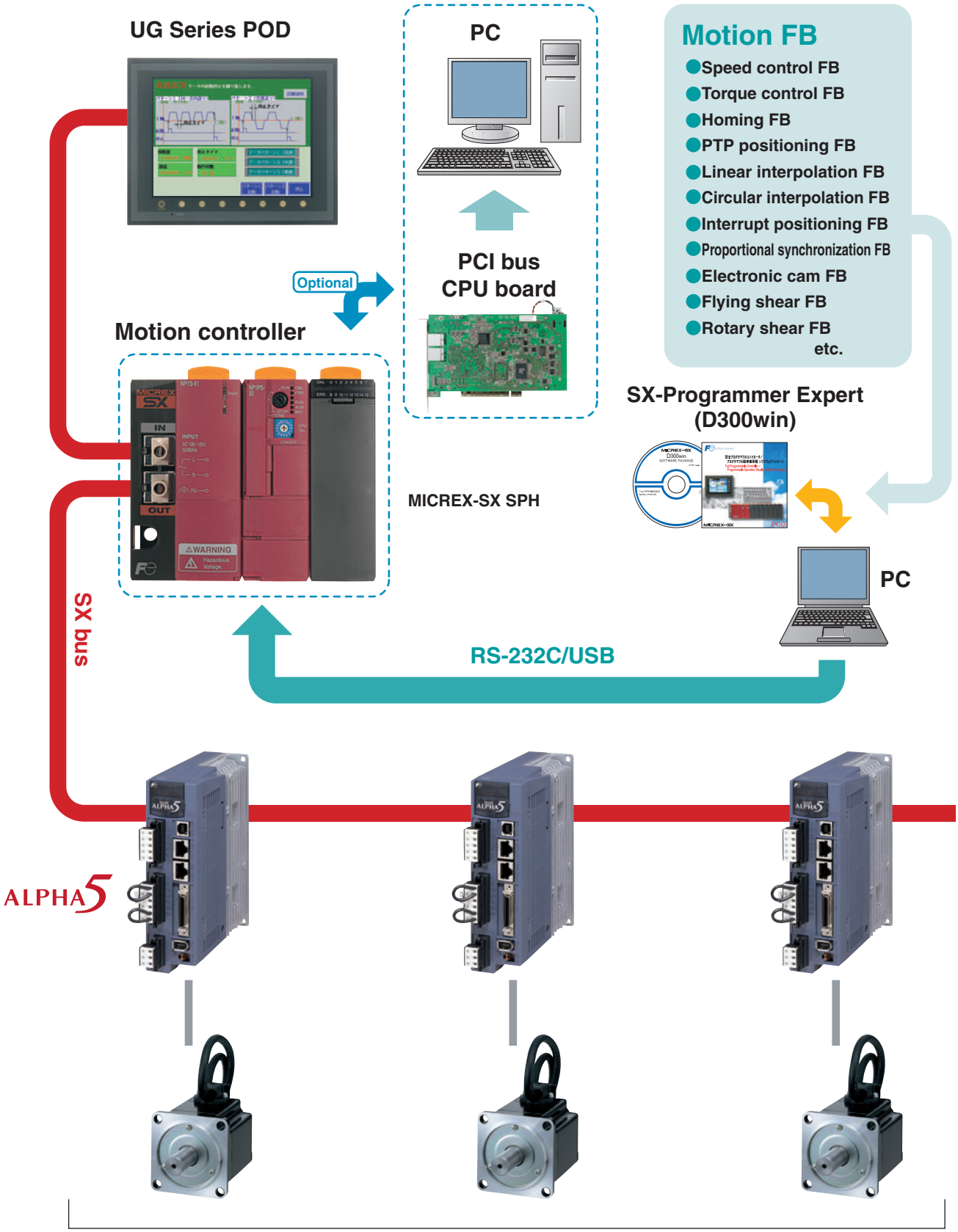
Compatibility with SX bus: VS type and LS type

Sophisticated motion control system that has synchronizationand interpolation controls can be configured easily.



Total extension 25m (maximum), 32 connection units (maximum)

Explanation of Model Codes

Servo amplifier

RYT 500 D 5 – V S 2

Code	[Basic type]
RYT	ALPHA5 series

Code	[Applicable motor output]
500	50×10^{0}=0.05kW
101	10×10^{1}=0.1kW
201	20×10^{1}=0.2kW
401	40×10^{1}=0.4kW, 0.375kW
501	50×10^{1}=0.5kW
751	75×10^{1}=0.75kW
851	85×10^{1}=0.85kW
102	10×10^{2}=1.0kW
132	13×10^{2}=1.3kW
152	15×10^{2}=1.5kW
202	20×10^{2}=2.0kW
302	30×10^{2}=3.0kW
402	40×10^{2}=4.0kW
502	50×10^{2}=5.0kW

Code	[Series]
D	3000r/min series
C	2000r/min series
B	1500r/min series

Code	[Order of development]
5	5

Code	[Input voltage]
2	3-phase 200 VAC
6	Single-phase 100 VAC

Code	[Upper interface]
S	SX bus
V	General-purpose interface (pulse, analog voltage)

Code	[Major functions]
V	Position, speed and torque control
L	Built-in positioning function

Servo motor

GYS 500 D 5 – H B 2 – B

Code	[Basic type]
GYS	Slim type (Ultra-low inertia)
GYC	Cubic type (Low inertia)
GYG	Middle inertia type

Code	[Rated output]
500	50×10^{0}=0.05kW
101	10×10^{1}=0.1kW
201	20×10^{1}=0.2kW
401	40×10^{1}=0.4kW, 0.375kW
501	50×10^{1}=0.5kW
751	75×10^{1}=0.75kW
851	85×10^{1}=0.85kW
102	10×10^{2}=1.0kW
132	13×10^{2}=1.3kW
152	15×10^{2}=1.5kW
202	20×10^{2}=2.0kW
302	30×10^{2}=3.0kW
402	40×10^{2}=4.0kW
502	50×10^{2}=5.0kW

Code	[Rated speed]
D	3000r/min series
C	2000r/min series
B	1500r/min series

Code	[Order of development]
5	5

Code	[Brake]
Blank	Not provided
B	Provided

Code	[Input voltage]
2	3-phase 200 VAC
6	Single-phase 100 VAC

Code	[Oil seal/shaft]	Applicable motor GYS, GYC, GYG
A	Without an oil seal, straight shaft with a key	△ (*○)
B	Without an oil seal, straight shaft without a key	◎
C	Without an oil seal, straight shaft with a key, tapped	○
E	With an oil seal, straight shaft with a key	△
F	With an oil seal, straight shaft without a key	△
G	With an oil seal, straight shaft with a key, tapped	△

◎: Standard item ○: Semi-standard item
△: Made-to-order item
* Applicable with GYS and GYC motors of 0.1kW or less

Code	[Encoder]
H	18-bit ABS/INC
R	20-bit INC

Specifications of Servo Amplifier

Common specifications

Applicable motor rated speed			3000r/min				3000r/min											2000r/min					1500r/min		
Applicable motor output [kW]			0.05	0.1	0.2	0.375	0.05	0.1	0.2	0.4	0.75	1.0	1.5	2.0	3.0	4.0	5.0	0.5	0.75	1.0	1.5	2.0	0.5	0.85	1.3
Amplifier type RYT□□□	D5-△△○		500	101	201	401	500	101	201	401	751	102	152	202	302	402	502								
	C5-△△2																	501	751	102	152	202			
	B5-△△2																						501	851	132
Outer frame number			Frame 1		Frame 2	Frame 3	Frame 1			Frame 2	Frame 3	Frame 4		Frame 5		Frame 6		Frame 3		Frame 4	Frame 5		Frame 3	Frame 4	Frame 5
Mass [kg]			0.9		1.1	1.3	0.9			1.1	1.3	1.5		2.6		3.8		1.3		1.5	2.9		1.3	1.5	2.9
Protective construction / cooling			Open / self-cooling			Open / forced air cooling	Open / self-cooling				Open / forced air cooling							Open / forced air cooling					Open / forced air cooling		
Power supply	Main power supply	Phase	Single-phase				Single-phase, 3-phase					3-phase						Single-phase, 3-phase		3-phase			Single-phase, 3-phase	3-phase	
		Voltage frequency	AC100 to 120V 50/60Hz				AC200 to 240V 50/60Hz																		
		Allowable voltage fluctuation	AC85 to 132V				3-phase: AC170 to 262V, Single-phase: AC190 to 262V																		
	Control power supply	Phase	Single-phase																						
		Voltage frequency	AC100 to 120V 50/60Hz				AC200 to 240V 50/60Hz																		
		Allowable voltage fluctuation	AC85 to 132V				AC170 to 262V																		
Control system			IGBT PWM sinusoidal PWM drive																						
Max voltage for regenerative resistance [W]		Built-in resistor	-	-	8	20	-	-	-	8	20	20	20	30	30	60	60	20	20	20	30	30	20	20	30
		External resistor *1	17	17	25	25	17	17	17	17	50	50	50	260	260	300	300	50	50	50	260	260	50	50	260
Dynamic brake			Built-in *2																						
Feedback			18-bit serial encoder (absolute/incremental), 20-bit serial encoder (incremental)																						
Overload capability			300% / 3 sec.																						
Speed fluctuation ratio		Load fluctuation	Within ±1 r/min (load fluctuation 0 to 100%)																						
		Power supply fluctuation	Within ±1 r/min (power supply fluctuation -10 to +10%)																						
		Temperature fluctuation	Within ±0.2% (25 ±10°C at rated operation speed and analog input operation)																						
Capability and function	VV type	Speed control function	Closed loop control with speed adjuster, acceleration/deceleration time setting, manual feed rate/max. rotation speed, speed command zero clamp, etc.																						
		Number of position data sets	15-point (position, speed, acceleration/deceleration time setting, timer, M code and various statuses)																						
		Positon control function	Closed loop control with position adjuster, electronic gear, output pulse setting, feed forward, homing, interrupt positioning, auto startup, etc.																						
		Torque control function	Closed loop control with current adjuster (proportional open loop control of current and torque), torque limit, speed limit at torque control, etc.																						
		Accessory functions	Easy tuning, profile operation, sequence test mode, auto tuning, auto notch filter, vibration suppressing online learning, etc.																						
	VS type	Speed control function	Closed loop control with speed adjuster, acceleration/deceleration time setting, manual feed rate/max. rotation speed, etc.																						
		Positon control function	Closed loop control with position adjuster, electronic gear, output pulse setting, feed forward, homing, interrupt positioning, etc.																						
		Torque control function	Closed loop control with current adjuster (proportional open loop control of current and torque), torque limit, speed limit at torque control, etc.																						
		Accessory functions	Easy tuning, profile operation, sequence test mode, auto tuning, auto notch filter, vibration suppressing online learning, etc.																						
	LS type	Positon control function	Automatic startup, manual operation, pulse train, homing																						
		Number of position data sets	99-point (position, speed, timer, M code and various statuses)																						
		Max positioning value	±2,000,000,000																						
		Positioning method	Absolute / incremental																						
		Accessory functions	Easy tuning, profile operation, sequence test mode, auto tuning, auto notch filter, vibration suppressing online learning, etc.																						
Protective function (Alarm indication)			Overcurrent(oc1, oc2), Overspeed(oS), Control power undervoltage(Lvc), Overvoltage(Hv), Encoder trouble(Et1, Et2), Circuit trouble(ct), Memory Error(dE), Fuse Broken(Fb), Motor Combination Error(cE), Braking transistor overheat(tH), Encoder Communication error(Ec), CONT(Control signal) Error(ctE), Overload(oL1, oL2), Main power undervoltage(LvP), Braking resistor overheat(rH1, rH2, rH3), Deviation overflow(oF), Amplifier overheat(AH), Encoder overheat(EH), Absolute data Lost(dL1, dL2, dL3), Multi-turn data over flow(AF), Initial Error(iE), Command pulse Frequency Error(HF)																						
Operation and display section of main body (keypad)			6-digit alphanumeric display with 7-segment LED 4 operation switches Analog monitor connector (CN6), status indication LED																						
Working conditions		Installation place	Indoors (free from direct sunshine), altitude ≤ 1000m, free from corrosive and flammable gases, oil mist and dust In case of compliance with CE marking Models compliant with EU directive: pollution degree 2, over voltage category III																						
		Temperature/humidity	-10 to 55°C/10 to 90%RH (without condensation)																						
		Vibration / shock resistance	4.9m/s²/19.6m/s²																						
Standards			UL/cUL (UL508c), CE marking (low voltage directive EN61800-5-1) (acquisition being applied for model of 2.0kW or more), RoHS directive																						

*1: The figure is data determined when the amplifier is connected with an external resistor dedicated for each model.

*2: We will accept custom orders for models without dynamic brake.

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Programmable Controllers

MICREX-SX Series

SPH

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Realizes High-Speed Advanced Machine Control

Ultra-high-speed 1 ms controller

1 ms scan

- Program scan time of 1ms is implemented by increased instruction processing speed.
- Real number operation and high-precision positioning control have been put to practical use by dramatically improved floating-point operation speed.

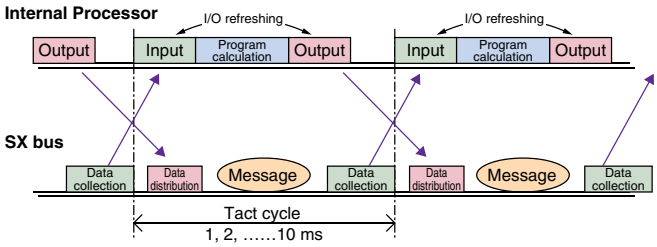
	SPH3000 (D)	SPH300	SPH2000	SPH200
Basic instruction LD	9 ns	20 ns	30 ns	70 ns
MOV	8 ns	40 ns	40 ns	140 ns
Floating Operation instruction	88 ns	80 ns	270 ns to	56000 to

* For details on each instruction word's processing speed and tact cycle, see the User's Manual (FEH200).

1 ms I/O refreshing

- 1024 points of I/O is refreshed in 1 ms
- Tact control assures a fixed I/O refresh interval. The I/O refresh cycle can be set to 1 ms, 2 ms, or up to 10 ms, which is suitable for processing requiring strict tact time.
- The minimum tact times of SPH3000MM, SPH300, and SPH2000/SPH3000 can be set at 0.25 ms, 0.5 ms, and 1 ms, respectively.

●Operating timing



Tact cycle

E-SX bus

Tact cycle		0.25 ms	0.375 ms	0.5 ms	1 ms	1.5 ms	2 ms
Max. I/O size (Number of I/O stations)	4 stations	67 words	256 words	512 words	2048 words	2048 words	4096 words
	16 stations	-	-	256 words	1024 words	1024 words	1024 words
	32 stations	-	-	-	512 words	2048 words	2048 words
	64 stations	-	-	-	-	512 words	1024 words

SX bus

Tact cycle	0.25 ms	0.375 ms	0.5 ms	1 ms	1.5 ms	2 ms
Max. I/O size	-	-	64 words	128 words	256 words	512 words

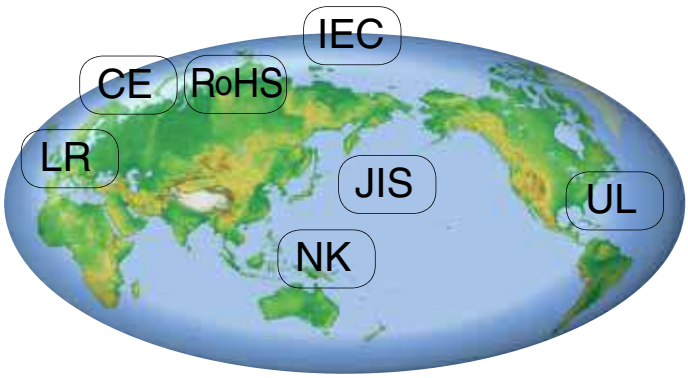
Controller conforms to International Standard

Conforms to IEC 61131 international standard

- Both the hardware and software conform to the IEC 61131 international standard for programmable controllers.
- The programming language conforms to the IEC 61131-3 international standard.

Conforming to international standard

- Conforms to the CE marking, UL standards and RoHS directive (conforming one after another) as well as IEC standard.
- It also complies with the NK marine standard (Japan) and the LR (specifications of Lloyd's Register of Shipping, UK).

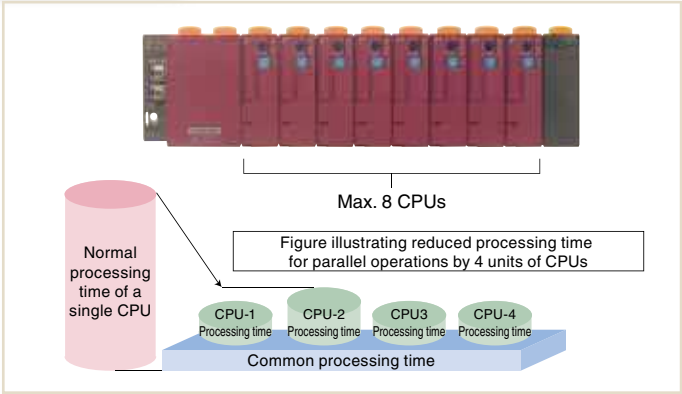


Programmable Controller

Multi-CPU system applicable to up to 8 CPUs

Parallel processing with up to 8 CPUs (SPH300/SPH2000/SPH3000)

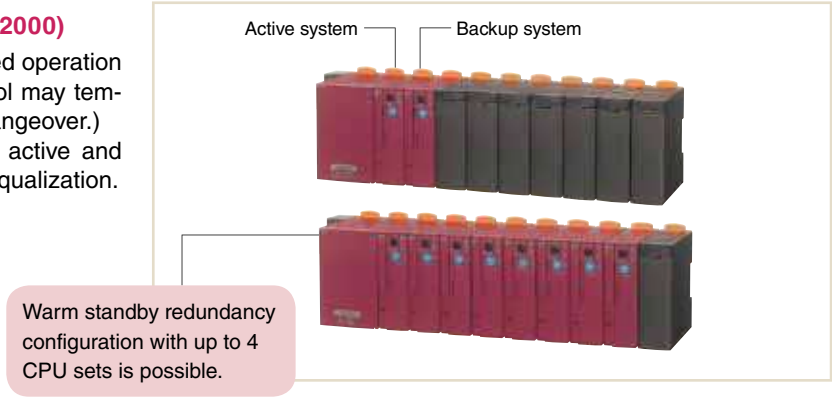
- Alleviates the load for each CPU allowing high-speed processing of a large application program. For example, the load can be distributed for advanced processing and sequence control processing with additional CPUs. I/O refresh control is performed automatically even if parallel processing by multiple CPUs is performed.



Redundant System Brings System Safety and Reliability

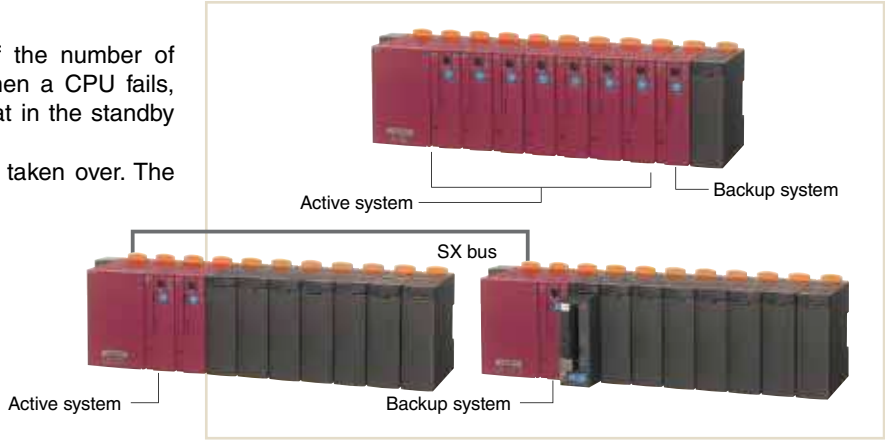
1:1 warm-standby feature (SPH300/SPH2000)

- This redundancy configuration enables continued operation without system downtime if a CPU fails. (Control may temporarily stop due to fault detection and CPU changeover.)
- The same program is stored in CPUs for the active and backup systems, allowing constant data value equalization.

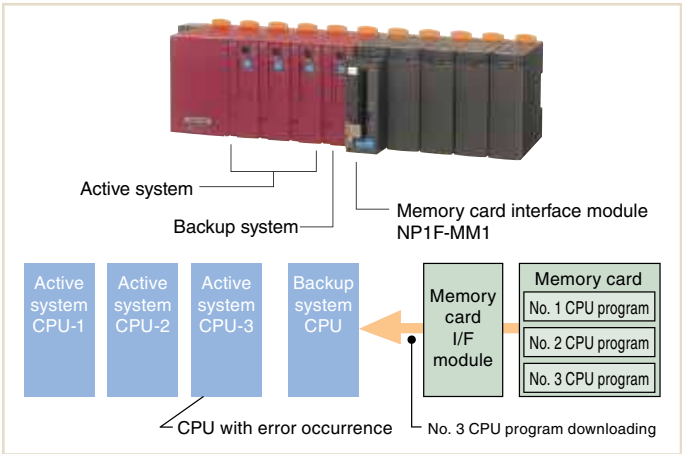


N:1 cold-standby feature (SPH300)

- N:1 backup feature enables reduction of the number of standby system CPUs to one, though when a CPU fails, data retained in the active system and that in the standby system are not equalized.
- Data retained by the active system is not taken over. The backup system CPU performs initial start.



- Programs can be intensively controlled by a memory card. Programs for N units of systems can be stored on a memory card, which is installed in the memory card interface module for centralized control of the programs. The same processing programs as on the down CPU are downloaded to the backup system CPU.



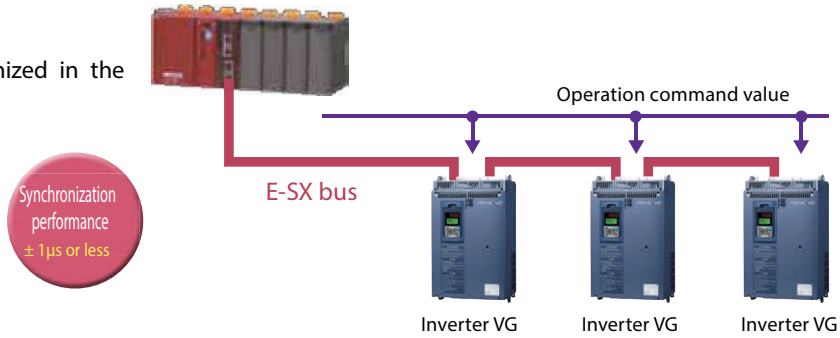
Note 1: The model that supports SPH2000 is NP1PM-256H.
Note 2: For a redundancy configuration buildup with a DC power supply, contact our sales section.

Programmable Controller

Synchronization control of E-SX bus

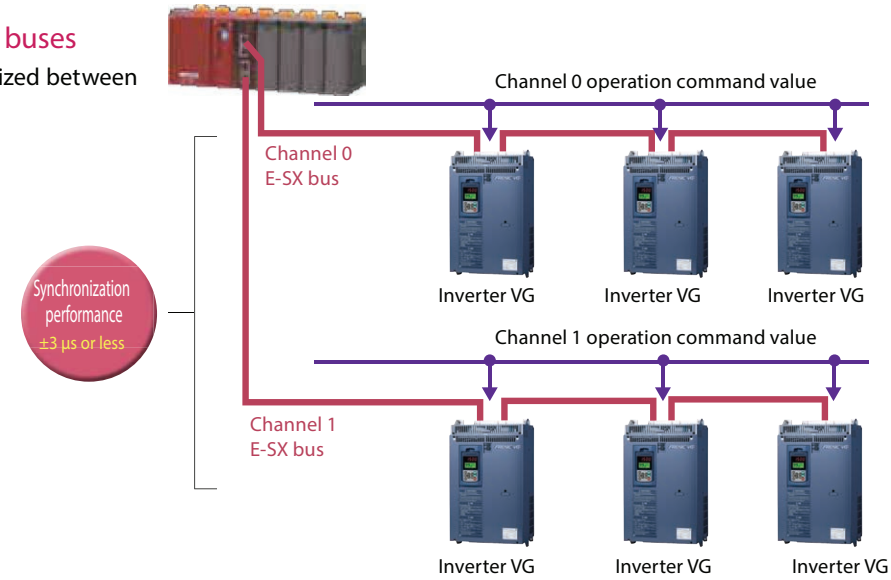
Synchronization in the bus

Data output timing is synchronized in the E-SX bus.



Synchronization between buses

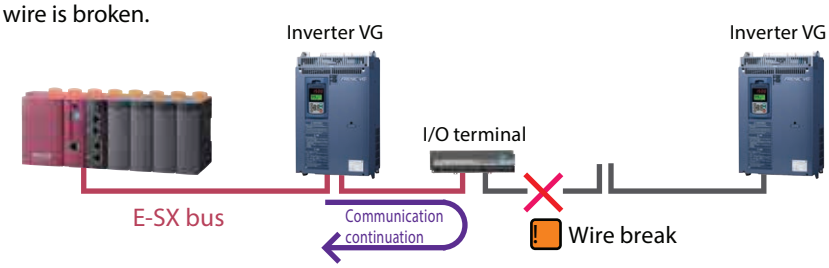
Data output timing is synchronized between channels of the E-SX b us.



Connection function of the E-SX bus

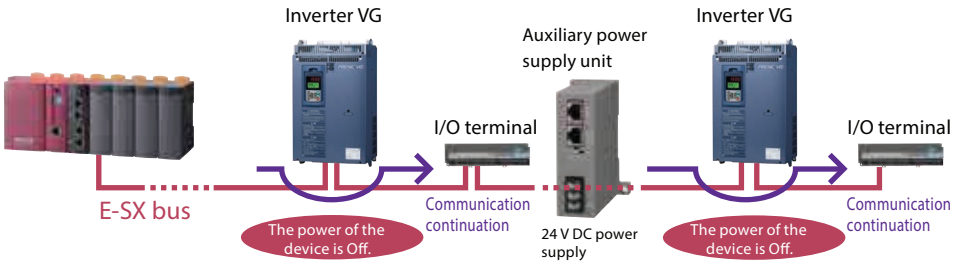
Loopback function

Communication is continued by the signal repeater function even when a wire is broken.



Signal bypass function

Even when a power of some devices is not turned on, the communication is continued by the auxiliary power unit.



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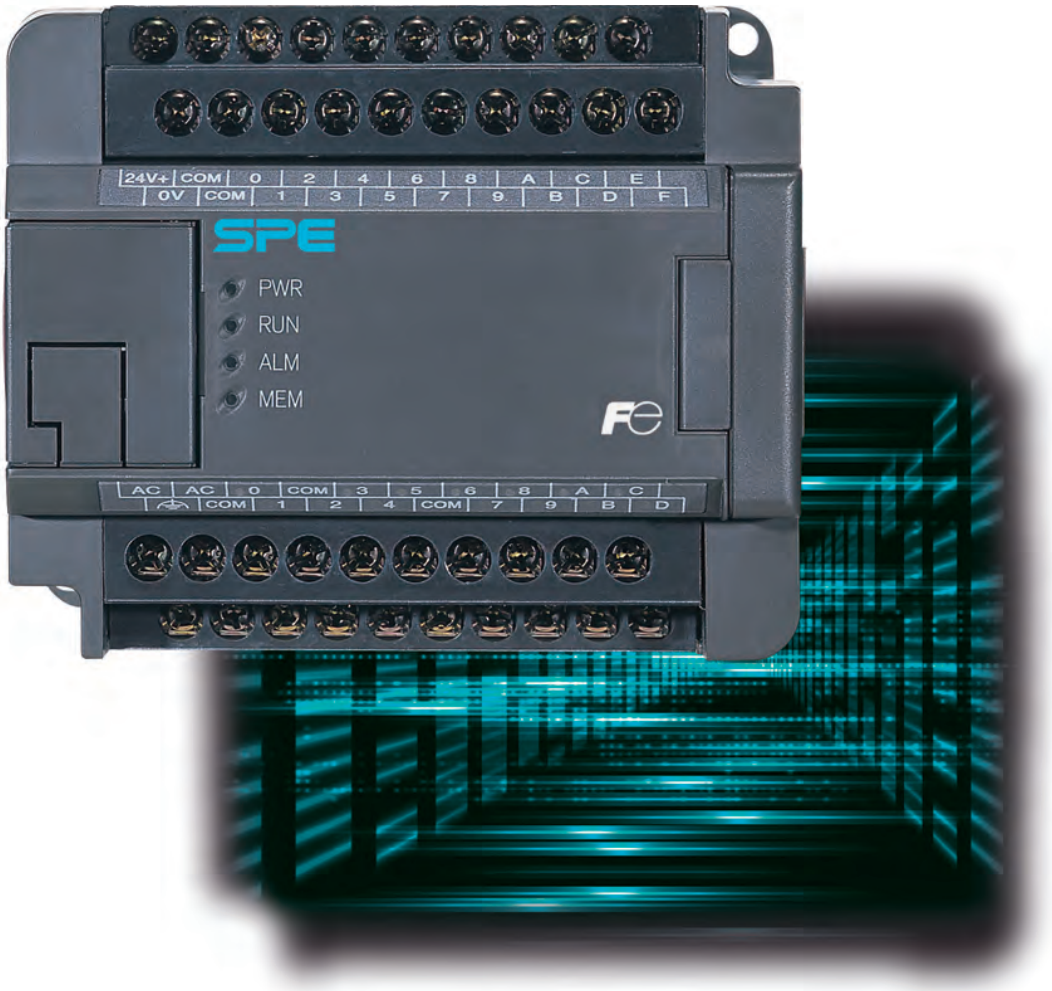
Integrated Controllers MICREX-SX Series

Programmable Logic Controller

SPE



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Compact size

Ideal for reducing control panel space.

	External Dimensions (mm)		
	Width	Height	Depth
20-points basic unit	80	90	81
30-points basic unit	110	90	81
40-points basic unit	140	90	81
60-points basic unit	180	90	81
16-points expansion unit	64	90	81
32-points expansion unit	110	90	81
60-points expansion unit	180	90	81

Two programming languages

With one type of hardware, SPB is applicable to two programming languages:

- SX mode: MICREX-SX (language compliant with IEC)
- N mode: FLEX-PC N (language of ladder and instruction words)

Large-capacity memory

Programming with rich memory

	Memory capacity			
	Porogram memory		Data memory	
Type	SX mode *1	N mode	SX mode	N mode
20points basic unit	2Ksteps	4Ksteps	5Kwords	9Kwords
30points basic unit			8.5Kwords	
40points basic unit	4Ksteps	8Ksteps		
60points basic unit				

* 1 There are Included the initiated value of the retain memory.

High-speed processing

Ideal for small-size machines requiring fast processing.
Fast 0.44 µsec. per Sequence instruction and 2.19 µsec(N mode). and 1.50 µsec(SX mode). for Data instructions.

Many types of instructions

Many types of instructions allow ease of programming.
The program size can be reduced by effectively using a combination of instruction words.
SX mode: 202 types, N mode: 211 types.

Self-lifting terminal block & Finger protection

Use of the self-lifting terminal block - the terminals automatically pop up when unscrewed, reducing the wiring works and preventing less of screws. The finger protection structure ensures safety.

Online program edit function

Allows program modification without interrupting machine operation.

International standards conformity

SPE models conform to the UL/cUL standards as well as the CE mark standard. (Except specific types)

Two analog timers

Two analog timers are built in for convenient fine-tuning and testing.

Communication & Networking

Communication adapters are available for RS-232C, RS-485, and simplified personal computer link connections.

MONITOUCH direct connection

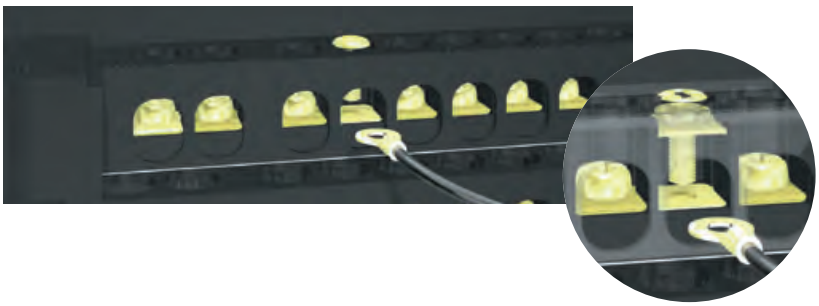
The SPE can be connected to the MONITOUCH via the loader port. No special communication unit is required.

Diversified functions for expanding applications

- Internal high-speed counter function
- Interrupting function
- Pulse train output function
- Pulse catch function
- Constant scan setting
- Pulse width modulation function

Adapted to analog control

Multi-range (voltage / current) adapted. 3 types of analog unit with detachable terminal blocks are added to the lineup.
Capable of analog control, such as temperature control by PID instruction.



System Configurations

Expansion Digital I/O System

●Basic Unit + Digital I/O Unit

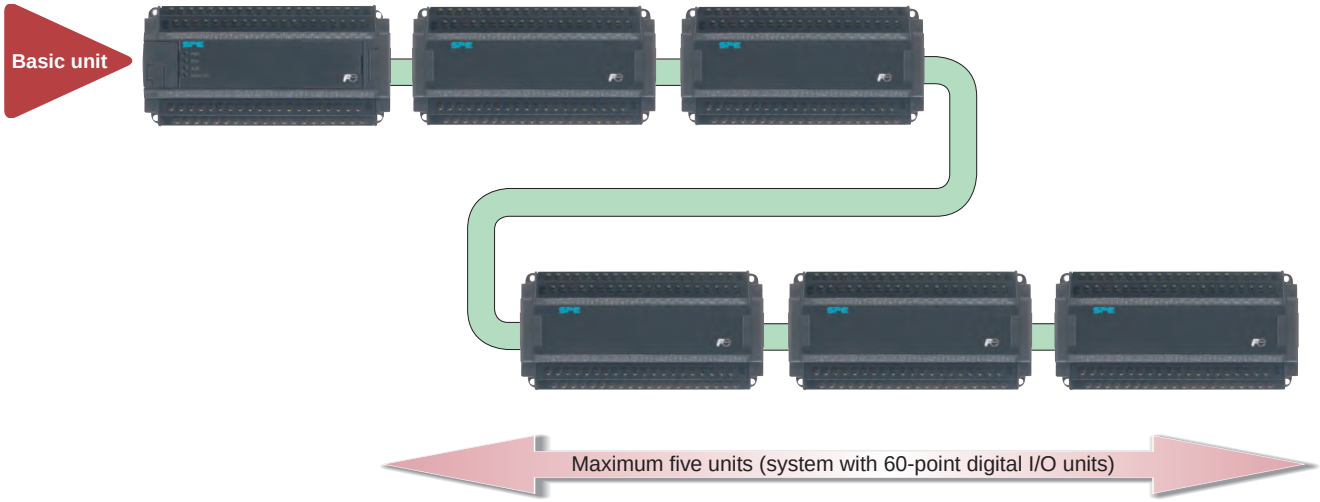
For the SPE, the number of I/O points can be increased up to 360 by adding digital I/O units to the basic unit. Up to five digital I/O units can be added.

	I/O Points	Max. digital I/O points
NW0P20□-3□ZSPE	20 points	20 points
NW0P30□-3□ZSPE	30 points	330 points
NW0P40□-3□ZSPE	40 points	340 points
NW0P60□-3□ZSPE	60 points	360 points

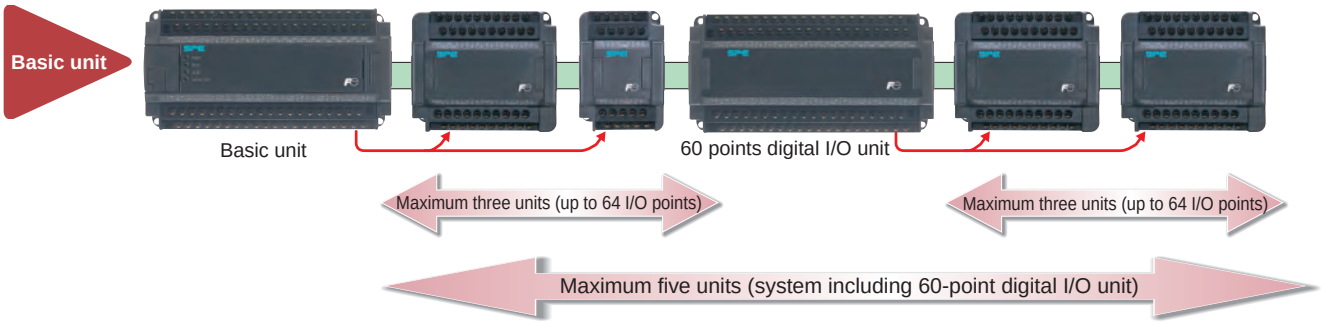
System with 60-point digital I/O units

A maximum of five 60-point digital I/O units, or 300 digital I/O points can be added.

360 points (60+60+60+60+60+60)



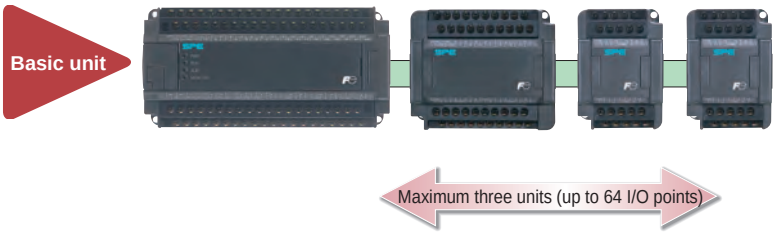
System with a combination of 16- 32- and 60-point digital I/O units



* The basic unit and 60-point digital I/O unit require a power supply. The 16-/32-point digital I/O units are supplied the power from the basic unit and 60-point digital I/O unit as indicated with an arrow (→). One basic unit or one 60-point digital I/O unit can supply power to a maximum of three expansion units (64 or fewer I/O points).

System with a combination of 16- and 32-point digital I/O units

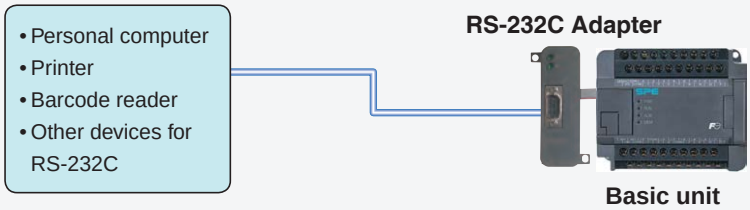
The system with no 60-point digital I/O units allows addition of a maximum of three units, or 64 digital I/O points.



System Configurations

Communication Systems

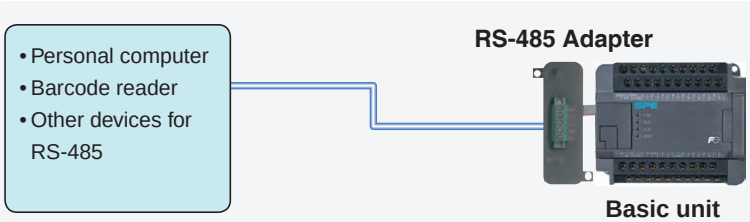
• System based on RS-232C Adapter: NW0LA-RS2ZSPE



Item	Specification
Electrical specifications	RS-232C
Communication specifications	Half-duplex transmission
Connection form	1:1
Transmission rate	38.4kbps max.
Transmission distance	15m max.
User interface	Nonsequenced transmission/ command set type transmission

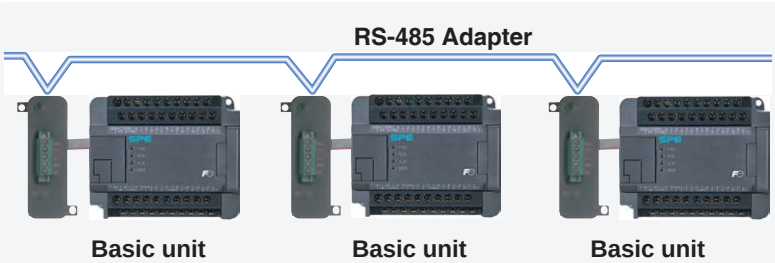
• System based on RS-485 Adapter: NW0LA-RS4ZSPE

1) RS-485 mode



Item	Specification
Electrical specifications	RS-485
Communication specifications	Half-duplex transmission
Connection form	1:31 (max.)
Transmission rate	38.4kbps max.
Transmission distance	1km max.
User interface	Nonsequenced transmission/ command set type transmission

2) Simplified CPU link mode



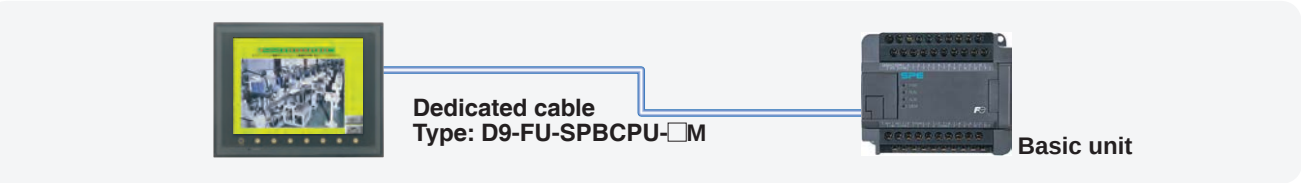
Item	Specification
Electrical specifications	RS-485
Communication specifications	NP link micro
Connection form	Bus
Transmission rate	125kbps max.
Transmission distance	500m max.
Number of units connected	16 units max.
Data amount	32 words/station max.

* When connecting with the NB series, the transmission rate is limited to 19.2 kbps and the data amount to 8 words/station.

• MONITOUCH Connections

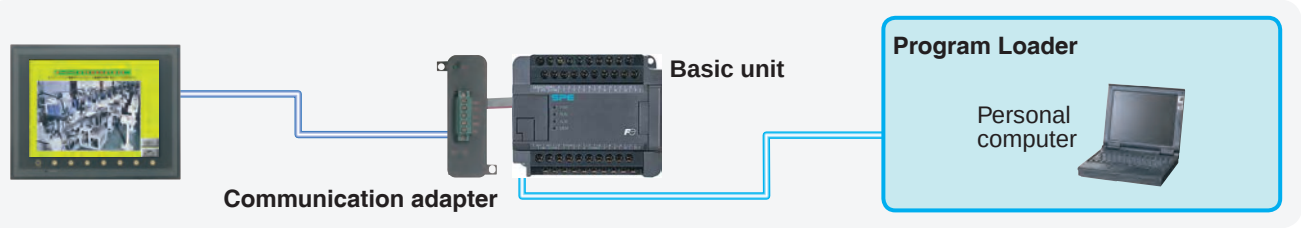
1) Loader port connection

MONITOUCH can directly be connected to the loader port.



2) General-purpose communication connection

Connection through the RS-232C/RS-485 adapter is possible.



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Achieving Cost Efficiency and High Performance Processing

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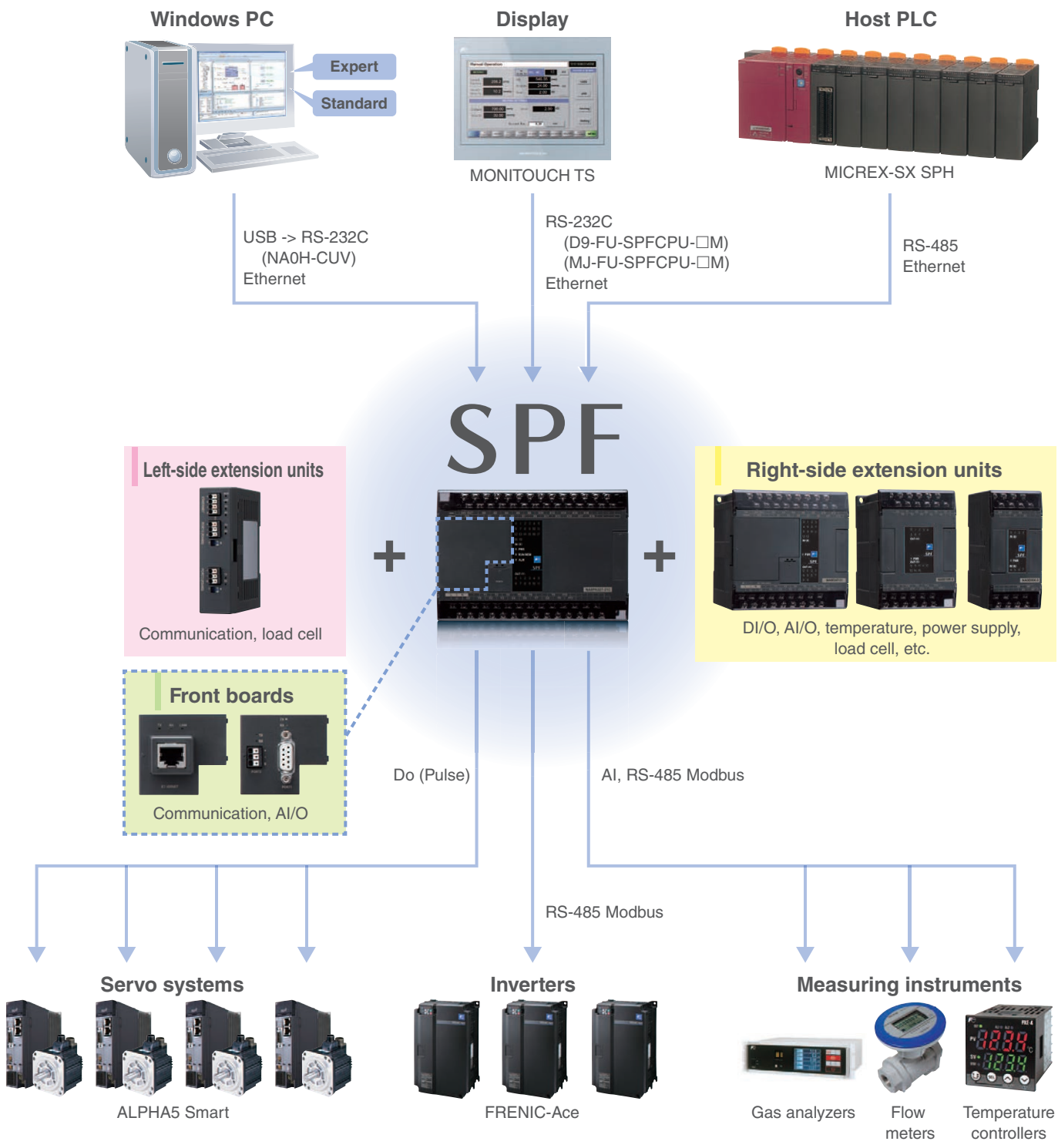
SYSTEM

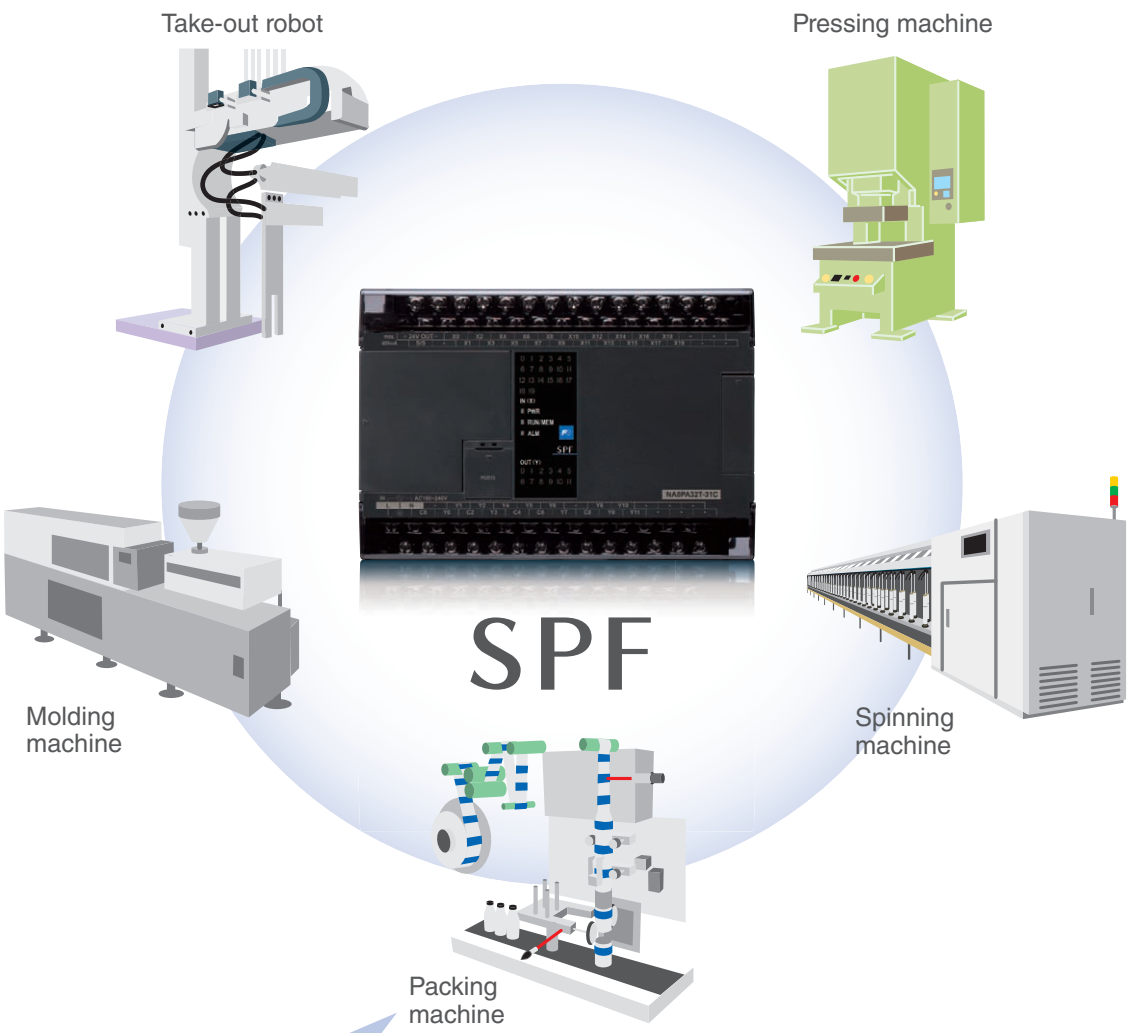
Flexible system construction by using extension units

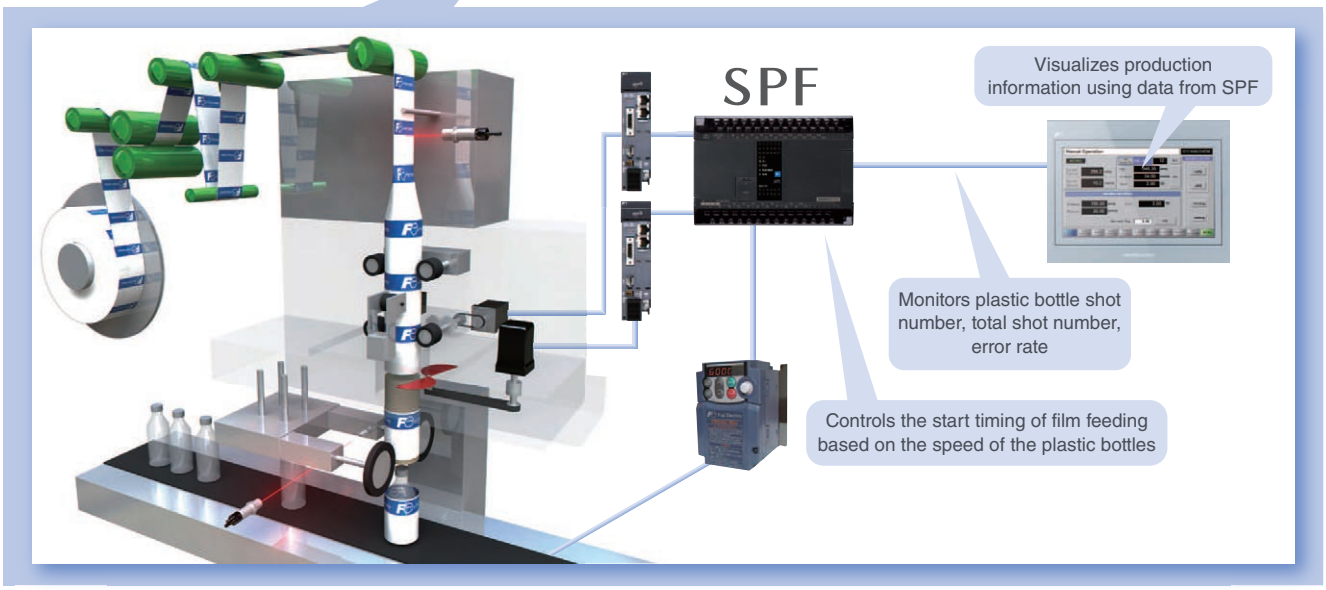


Constructing optimal systems using Fuji components

APPLICATION EXAMPLES

Flexibly supports machinery and systems





MODEL LINEUP

Basic unit (CPU unit)

14 points
Basic unit

NA0PA-14T-34C
Power supply voltage: 24 V DC
DI/O: input 8 points, output 6 points
Output type: Tr sink output
Detachable terminal block

NA0PB-14R-34C
Power supply voltage: 24 V DC
DI/O: input 8 points, output 6 points
Output type: Ry output

24 points
Basic unit

NA0PA-24T-□C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 14 points, output 10 points
Output type: Tr sink output
Detachable terminal block

NA0PB-24R-34C
Power supply voltage: 24 V DC
DI/O: input 14 points, output 10 points
Output type: Ry output

32 points
Basic unit

NA0PA-32T-□C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 20 points, output 12 points
Output type: Tr sink output
Detachable terminal block

NA0PB-32R-34C
Power supply voltage: 24 V DC
DI/O: input 20 points, output 12 points
Output type: Ry output

40 points
Basic unit

NA0PA-40T-□C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 24 points, output 16 points
Output type: Tr sink output
Detachable terminal block

60 points
Basic unit

NA0PA-60T-□C
Power supply voltage: 100 to 240 V AC or 24 V DC
DI/O: input 36 points, output 24 points
Output type: Tr sink output
Detachable terminal block

NA0PB-60R-34C
Power supply voltage: 24 V DC
DI/O: input 36 points, output 24 points
Output type: Ry output

Fuji Electric

Innovating Energy Technology

Programmable Operator Interface

MONITOUCH

Trading : Engineering Design : Contactor : Service

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MONITOUCH

WMI V9 Series NEW

Web Machine Interface

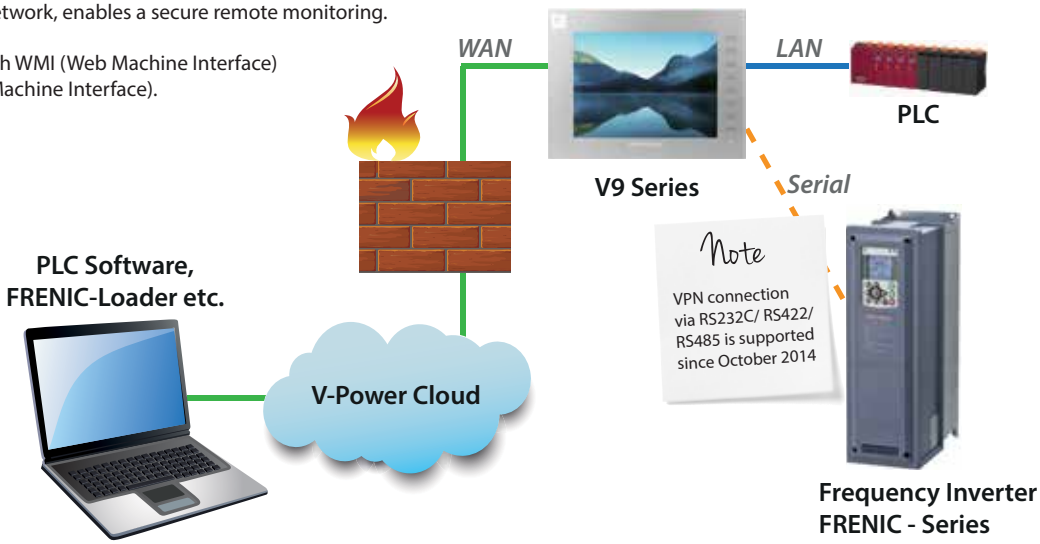
From Human Machine Interface
to Web Machine Interface

The biggest revolution on the Graphical User Interfaces.

A new concept, a new philosophy, by which every system integrator can heavily access to the latest remote VPN access technologies offered by the global networking without any specific knowledge.

V9, known as Web Machine Interface, is the new generation of MONITOUCH series which offers compatibility with mobile equipment, advanced use of information through networking, high-speed free-style drawing and optimum operability.

- VPN router inside:
  The routing function enables all the devices, which are connected to V9, to connect each other via Ethernet with only one click access to VPN.
- No need for IP masquerade setting:
  The VPN function which constructs a virtual private network whithin a public network, enables a secure remote monitoring.
- Can be used as both WMI (Web Machine Interface) and HMI (Human Machine Interface).



MONITOUCH V9 series (V9080iSLD and V9100iSLD) is fully compatible with VPN.
You can access PLC and FRENIC series inverters through V9 series remotely.

CE

V9 □□□i□□□D

Display size:
15: 15.0"
12: 12.1"
10: 10.4", 10.1"
08: 8.4"
07: 7.0"
06: 5.7"

Touch switch:
0: Analog resistance
1: Capacitance

Functional Specifications:
i: with built-in LAN port

Extended Wired LAN I/F:
L: With ext. wired LAN I/F
N/A: Without ext. wired LAN I/F

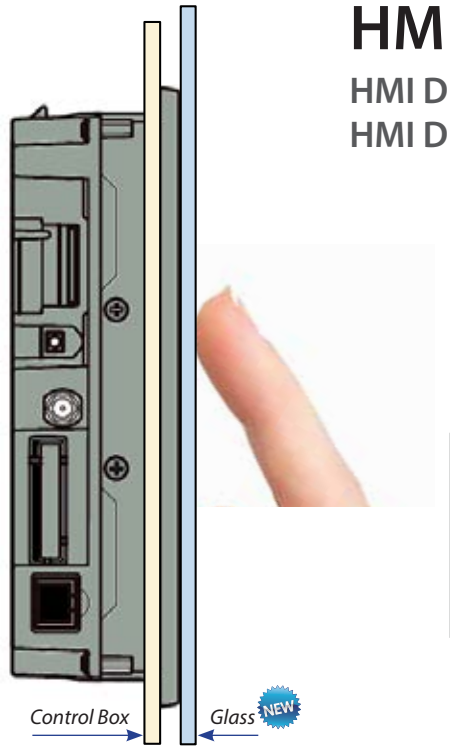
Wireless LAN I/F:
R: With wireless LAN I/F
N/A: Without wireless LAN I/F

Power Supply:
D: DC24V (CE/KC/UL/cUL certified)

Device Specifications:
W: TFT color LCD*
X: TFT color LCD (XGA)
S: TFT color LCD (SVGA)
C: TFT color LCD (VGA)
T: TFT color LCD (VGA)

*(10.1" wide = WSVGA / 7.0" wide = WVGA)

MONITOUCH



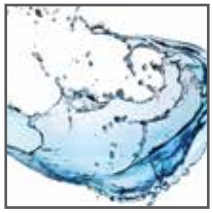
HMI MONITOUCH Hygiene NEW

HMI Displays for the Medical & Pharmaceutical Industry
HMI Displays for the Food & Beverage Industry

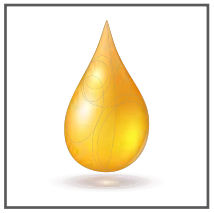
It's now possible to maintain the hygiene of the panel surface. In creating a flat, seamless panel surface, this also prevents the accumulation of dust and bacteria in any crevices.

Acid based cleaning agents, chemical

High pressure water, steam



Oil, grease, shortening and animal fats



1 Tablet Connection

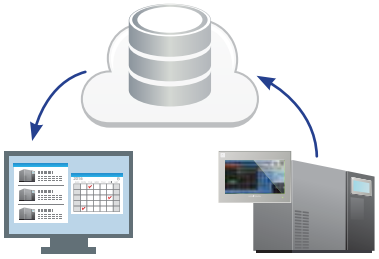
The MONITOUCH Hygiene series is equipped with VNC server function for remote monitoring and control of production directly from your tablet.

2 Database Connection

Machine data can be collected and saved within the database of the server, through the MONITOUCH Hygiene WLAN port.

3 VPN Connection

Our VPN remote access service enables support engineers to monitor and change screen programs from anywhere in the world.



7" wide
V9071iWRLD-xxx
V9071iWLD-xxx

10.1" wide
V9101iWRLD-xxx
V9101iWLD-xxx

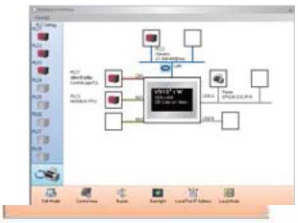
coming soon

Upgraded Operability

Ribbon Menu

The ribbon-shaped menu bar is available. Enlarged icons are easily visible also improves the operability remarkably.

Graphic Indication of System Configuration



The improved hardware setting screen makes it easy to grasp exactly how devices are connected together in the system.

Docking Windows

The project view windows and item view windows can be docked or floated easily.

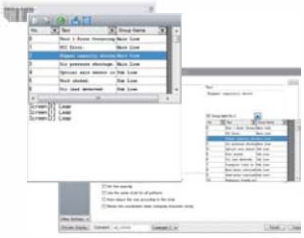
Integration of Search Menu

The search menu, which used to be displayed separately, has now been integrated for easy operation.

Enhanced Interlocking Setting

Interlock can be set with a ladder drawing screen. Multiple conditions for interlocking can be easily set. It is possible to set interlocking for keypad indication conditions in addition to switch conditions. Up to five conditions (AND or OR) for a bit device, word device or security device can be set, which is suitable for setting complicated conditions.

Character String Table



Text for switches, lamps and other parts can be managed centrally using the character string table. Frequently used text can be registered in the table for easy reference and batch modification.

* Switches, lamps, text, and multi text only.

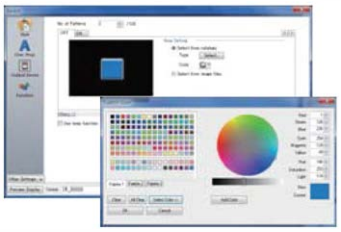
Facilitation of Screen Configuration

Guided Setting Process

With the help of the clear instructions in the dialog, setting can be conducted smoothly and collectively.

A Wider Range of Colors for 3D parts

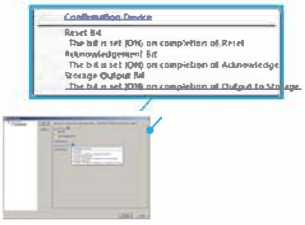
65,536 colors are available for 3D Parts.



Visualization of Setting

Set conditions can be confirmed on the preview screen before completing setting. By switching the preview screen and setting dialog, the setting can be confirmed easily even on a PC with low resolution.

Tool Hints to Support Configuration



Tool hints are provided at many points to support configuration. When you hover the mouse over the item, a hint for operation will appear. You can learn the procedure for configuration without referring to the manual.

Direct Editing with the Item View

In the item view, an indication range and component parts consisting of various parts including switches are selected. Since there is no need to select various items respectively, smooth and efficient editing is possible.

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Innovating Energy Technology

Programmable Display

TECHNOSHOT

Feel the difference

in power of expression,

speed and networking capability.

Trading : Engineering Design : Contactor : Service

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Wide screen to display more information

TS1100 series

10.2 inches | WVGA | 64K Colors | TFT | LED Backlight | 3ch Serial (D-sub9x2) | USB Master/Slave | Ethernet

TS1100 Model

TS1100□ ——— Functional specifications: NA: Without built-in LAN port i: With built-in LAN port

Specifications

Model			TS1100i	TS1100
Display	Display size		10.2" Wide	
	Resolution		800 × 480 dots	
	Display device		TFT color LCD	
	Colors		65,536 colors	
	Backlight		LED	
	Luminance		350 cd/m^2	
Touch switch			Analog resistance film	
Memory	FROM		10.5 MB	
	SRAM		128 KB	
External interface	Serial	COM1	RS-422/485, Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200/187500*1 bps	
		COM2 & COM3	RS-232C, Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200 bps	
			RS-422/485(two-wire system), Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200 bps	
	Ethernet		100BASE-TX/10BASE-T	–
	USB (Type A)		1 port (Ver. 2.0,Ver.1.1)	
	USB (Type mini B)		1 port (Ver. 2.0,Ver.1.1)	
Clock	Battery		Coin-type lithium primary battery	
	Calendar accuracy		Gap±5 sec. per month (Ambient temperature 25 °C)	
Power supply	Permissible range of voltage		DC 24 V ± 10 %	
	Demand (maximum rating)		16 W or less	
Physical environment	Ambient operating temperature		0-50 °C*2	
	Ambient storage temperature		-10-60 °C*2	
	Relative humidity		85 % RH or less(without dew condensation, Max. wet bulb temperature:39 °C or less)	
	Operation altitude		2,000 meters or less	
	Operation atmosphere		Not exposed to corrosive gas or excessive dust (free of conductive dust)	
	Contamination level		Level 2	
Installation conditions	Dimensions W × H × D		283.0 × 220.0 × 42.0 mm	
	Panel cutout W × H		257.0 × 199.0 mm (+0.5/-0)	
	Protect structure		Front panel: Compatible with IP65 (when waterproof gasket*3 is used.), Rear cabinet: Compatible with IP20 Form: Single unit, Installation method: Panel mounting	
Case color			Black	
Compatibility			CE, KC	

*1 Available only when connected with SIEMENS MPI. *2 Keep wet bulb temperature under 39°C to avoid an accident. *3 Option

Compact yet highly functional

TS1070 series

7 inches | WVGA | 64K Colors | TFT | LED Backlight | 3ch Serial (D-sub9x2) | USB Master/Slave | Ethernet

TS1070 Model

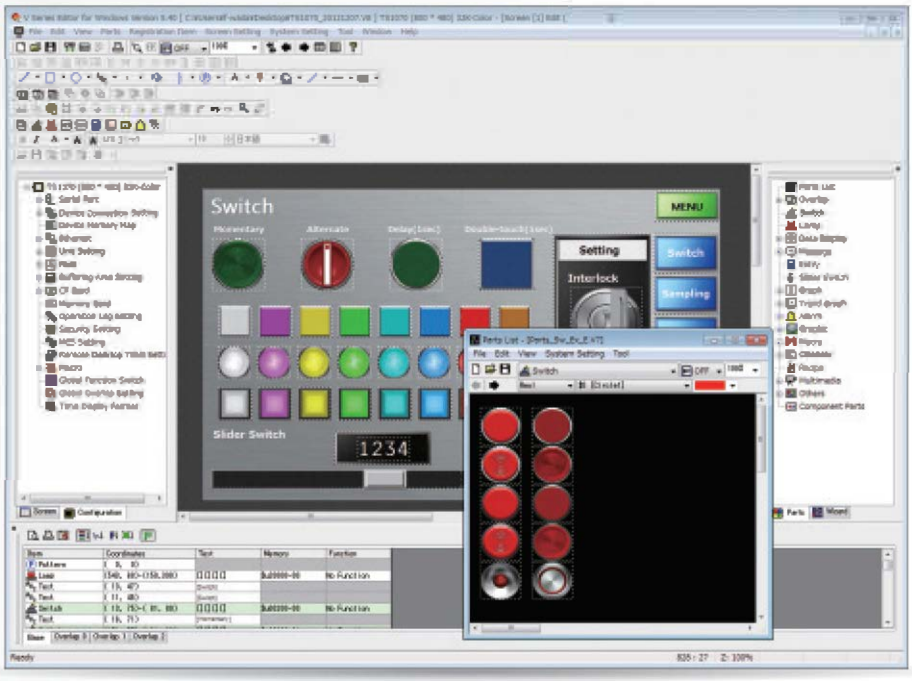
TS1070□ ——— Functional specifications: NA: Without built-in LAN port i: With built-in LAN port

Specifications

Model			TS1070i	TS1070
Display	Display size		7" Wide	
	Resolution		800 × 480 dots	
	Display device		TFT color LCD	
	Colors		65,536 colors	
	Backlight		LED	
	Luminance		450 cd/m²	
Touch switch			Analog resistance film	
Memory	FROM		10.5 MB	
	SRAM		128 KB	
External interface	Serial	COM1	RS-422/485, Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200/187500*1 bps	
		COM2 & COM3	RS-232C, Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200 bps	
			RS-422/485(two-wire system), Asynchronous, Data length: 7,8 bits, Parity: even/odd/none, Stop bit: 1,2 bits Baud rate: 4800/9600/19200/38400/57600/76800/115200 bps	
	Ethernet		100BASE-TX/10BASE-T	–
	USB (Type A)		1 port (Ver. 2.0,Ver.1.1)	
	USB (Type mini B)		1 port (Ver. 2.0,Ver.1.1)	
Clock	Battery		Coin-type lithium primary battery	
	Calendar accuracy		Gap±5 sec. per month (Ambient temperature 25 °C)	
Power supply	Permissible range of voltage		DC 24 V ± 10 %	
	Demand (maximum rating)		16 W or less	
Physical environment	Ambient operating temperature		0-50 °C*2	
	Ambient storage temperature		-10-60 °C*2	
	Relative humidity		85 % RH or less(without dew condensation, Max. wet bulb temperature: 39 °C or less)	
	Operation altitude		2,000 meters or less	
	Operation atmosphere		Not exposed to corrosive gas or excessive dust (free of conductive dust)	
	Contamination level		Level 2	
Installation conditions	Dimensions W × H × D		215.0 × 155.0 × 42.0 mm	
	Panel cutout W × H		189.0 × 134.0 mm (+0.5/-0)	
	Protect structure		Front panel: Compatible with IP65 (when waterproof gasket*3 is used.), Rear cabinet: Compatible with IP20 Form: Single unit, Installation method: Panel mounting	
Case color			Black	
Compatibility			CE, KC	

*1 Available only when connected with SIEMENS MPI. *2 Keep wet bulb temperature under 39°C to avoid an accident. *3 Option

MONITOUCH V-SFT Ver. 5



PC	PC/AT compatibles with Windows
OS	Windows98SE/ Me/ NT Version4.0/ 2000/ XP/ XP 64 Edition/ Vista 32bit/ Vista 64bit/ Win7 32bit/ Win7 64bit/ Win8 32bit/ Win8 64bit*
CPU	PentiumⅢ 800MHz or higher (Pentium4 2.5GHz or higher is recommended.)
Memory	512MB or more
Hard disk	For installation: 1GB or more space required
CD-ROM disk drive	24 times or faster
Display	Resolution of 1,024 × 768 (XGA) or higher
Color indication	High color (16 bit) or higher
Note	Microsoft.NET Framework4.0 or 4.5 (Framework4.0 will be installed automatically in Windows XP/ Vista/ 7 PCs that do not have NET Framework4.0 or 4.5 already installed.)

*For installing in Windows NT Version4.0/ 2000/ XP/ XP 64 edition/ Vista 32bit/ Vista 64bit/ Win7 32bit/ Win7 64bit/ Win8 32bit/ Win8 64bit, administrator authorization is required.
*TS series is compatible with Ver.5.4.28.0 or later.

01 Emulator

V-SFT Ver.5 allows debugging of the screen program on your PC.

02 Auto Resizing

Automatic resizing from QVGA (320×240) to WVGA (800×480). Previous screen program can be used without change.

QVGA(320×240) WVGA(800×480)

03 Function Switches Display*

Function switches on the previous models can be added to the screen, and the screen program for the function switches can be used as well.

Automatic arrangement of function switches

*Two-step switch operation is not available.

The functions that meet the needs of production sites

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TS2060

5.7 Inches | QVGA | 64K Colors | TFT | LED Backlight | 2ch Serial | USB miniB

TS2060i

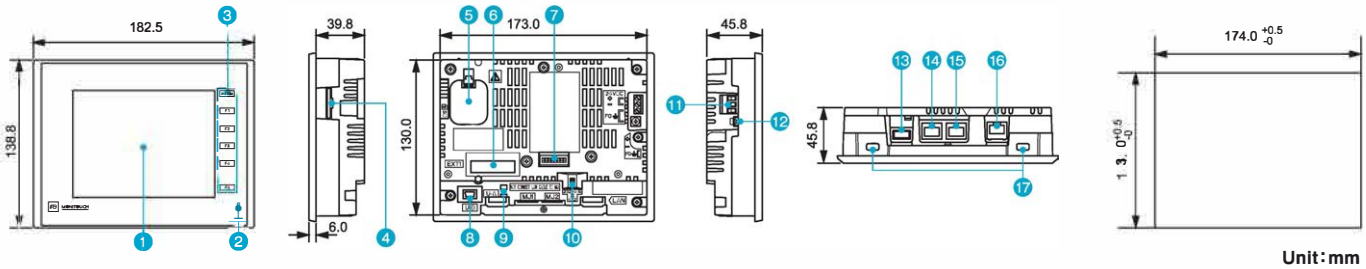
5.7 Inches | QVGA | 64K Colors | TFT | LED Backlight | 2ch Serial | USB miniB | USB A | SD card | Built-in Ethernet | Comm unit*

* DUR-00 and CUR-xx can be attached.

		TS2060	TS2060i
Screen memory (FROM)		2.5M bytes	10.5M bytes
Backup memory (SRAM)		128K bytes	512K bytes
Stroke font		–	Compatible
Screen specifications	Display device	TFT color	
	Resolution	320 × 240 dots	
	Display size	5.7 inches (QVGA)	
	Colors	65,536 colors(The software is compatible with displays in 32K colors, 256 colors, 128 colors and monochrome.)	
	Backlight	LED	
	Backlight life	50,000 hrs	
Touch switch	Type	Analog resistive film	
Function switch	Number of switches	6	
External interface	D-Sub 9-pin*1	–	RS-232C/RS-422/RS-485, asynchronous type, Data length: 7, 8 bits, Parity : odd, even, none, Stop bit : 1, 2 bits, Baud rate : 4800, 9600, 19200, 38400, 57600, 76800, 115200 bps
	Modular 8-pin (MJ1/2)	RS-232C/RS-422 (4-wire type)*2/RS-485 (2-wire type), asynchronous type, Data length : 7, 8 bits, Parity : odd, even, none, Stop bit : 1, 2 bits, Baud rate : 4800, 9600, 19200, 38400, 57600, 76800, 115200, 187500 bps*3	
	SD card	–	1 card slot (SD/SDHC card)
	Ethernet	–	1CH, Baud rate : 100Mbps, 10Mbps
	USB	Type mini-B (Ver. 2.0)	Type A,Type mini-B (Ver. 2.0)
	Communication unit	–	CUR-xx compatible
Power supply	Permissible range of voltage	DC24 V ± 10%	
	Demand (maximum rating)	13W or lower	
Physical environment	Ambient temperature	0℃ ~ +50℃*4	
	Ambient storange temperature	-10℃ ~ +60℃*4	
	Ambient humidity	85% RH or less (without dew condensation)	
	Storage humidity	85% RH or less (without dew condensation)	
	Operation altitude	2,000 meters or less	
	Operation atmosphere	Not exposed to corrosive gas or excessive dust (free of conductive dust)	
	Contamnation level	Level 2	
Installation conditions	Grounding resistance	Less than 100 Ω, FG/SG separation	
	Protect structure	Front panel : Compatible with IP65 (when gasket is used), Rear cover : Compatible with IP20	
	Cooling system	Natural air cooling	
	Dimensions W×H×D	182.5 × 138.8 ×45.8 mm	
	Panel cutout	$174.0^{+0.5}_{-0} \times 131.0^{+0.5}_{-0}$ mm(Same as for V806/V606e/S806)	
Compatible standards		CE/KC/UL61010-1, UL61010-2-201	
Case color		Black	
Battery		Built-in button battery / Battery life : 5 years (ambient temperature 25°C)	

*1 Only when an optional unit DUR-00 is attached to TS2060i. *2 Only MJ2 is compatible with 4-wire system.
*3 SIEMENS MPI / PPI at 187500 bps is available only with MJ2. *4 Keep wet bulb temperature under 39°C to avoid malfunction.

Dimensions and Part Names



Part Names

①Display	⑦DIP switch	⑬USB-A (U-A)*
②Power lamp	⑧USB mini-B (U-B)	⑭Modular jack (MJ1)
③Function switches	⑨USB cable fixing hole	⑮Modular jack (MJ2)
④SD card connector (SD)*	⑩Slide switch	⑯100BASE-TX/10BASE-T connector (LAN)*
⑤Battery holder	⑪Terminal block	⑰Screw hole
⑥Communication interface unit connector (EXT1)*	⑫Communication FG terminal	

* Only TS2060i.

Model Designation

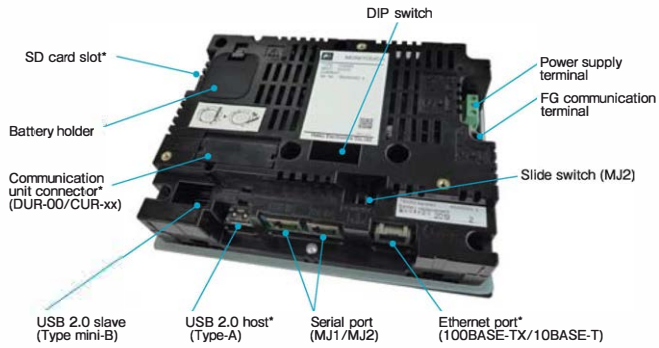
TS2060i

TS2060

i : Optional unit DUR-00 and CUR-xx can be attached.
SD/SDHC slot: 1CH
Ethernet: 1CH
USB Type A: 1 port
External 5V power supply available

None : No above external interfaces
External 5V power supply not available

Interface



* Only TS2060i.

Optional Units

V-SFT-6 (Configuration software)
Compatible OS: Windows XP / XP 64 Edition / Vista (32bit,64bit) Win7 (32bit,64bit) / Win8 (32bit,64bit) / Win8.1 (32bit,64bit) / Win10 (32bit,64bit)

TC-D9 (Terminal Converter)*
RS-422/485 terminal converter to connect DUR-00 and a communication unit

UA-FR (USB-A port cable)*
Cable to connect to the USB-A (master) port

V906T-GS,V906T-GSN10
Protection sheet (5 sheets)
Non-glare type (V906T-GSN10) is available.

TS-BT (Battery)
Lithium battery for TS2000 series

DUR-00 (Optional unit)*
For attaching a Dsub9 pin

CUR-xx (Communication interface units)*
Communication units for connecting with networks.

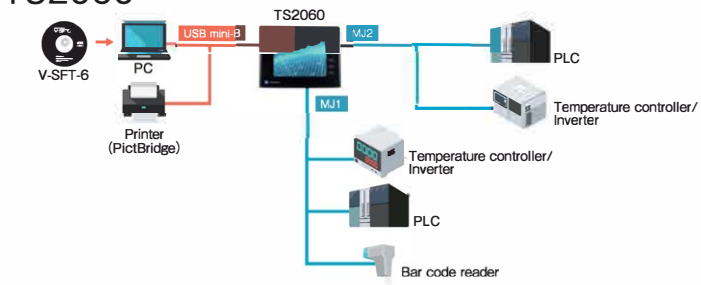
CUR-00 : OPCN-1	CUR-04 : PROFIBUS-DP
CUR-01 : T link	CUR-06 : SX bus
CUR-02 : CC-Link	CUR-07 : DeviceNet
CUR-03 : Ethernet	CUR-08 : FL-net

⚠ DUR-00 and CUR-xx cannot be used simultaneously.

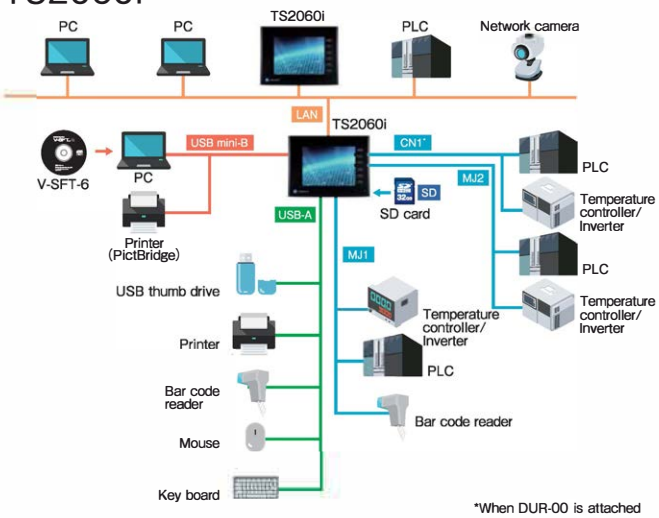
* Only TS2060i.

System Configuration

TS2060



TS2060i



Fuji Electric
Innovating Energy Technology

New-Generation PXF Series

Digital Temperature Controller

Exceeding Your Expectations...

- ✓ High Speed and High Accuracy
- ✓ Multi-Drop Master Function
- ✓ Universal Input

Trading : Engineering Design : Contactor : Service

ST CONTROL
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Superior Versatility and Flexibility for a Wide Range of Applications

Multi-Functional to Suit Your Needs

In addition to 9 types of temperature control functions including on-off control, heating/cooling control, and 2-degrees-of-freedom PID, useful functions such as multi-drop control using RS-485 network and simple watt-hour monitoring are available. All these features make PXF practical for any applications.

*For details of each functions, see pages 4–7.

Accuracy ±0.2% (depends on input type and range)

Fast Control 100ms

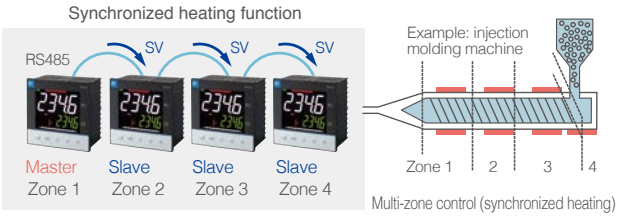
Operating Days Alarm

Sampling Rate 50 ms

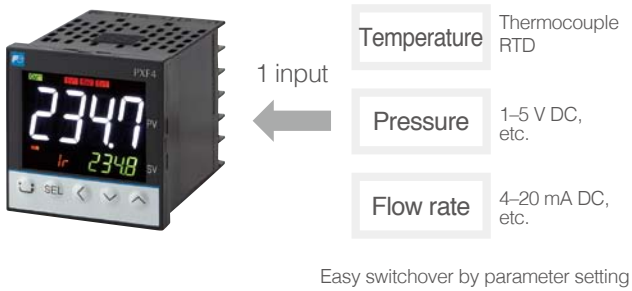
Simple Watt-Hour Metering Function

RS-485 Communication (option)

SV can be transmitted to multi-PXFs through communication. Synchronous temperature-rise control is available in combination with 2-degrees-of-freedom PID.



Universal Input



Easy switchover by parameter setting

Tallest PV Characters in the Industry

Bright and clear white PV display for optimal viewing

Compact Design

With only 58-mm depth, compact enough to be installed on small equipment

Size Selection

3 different sizes, with a depth of 58 mm

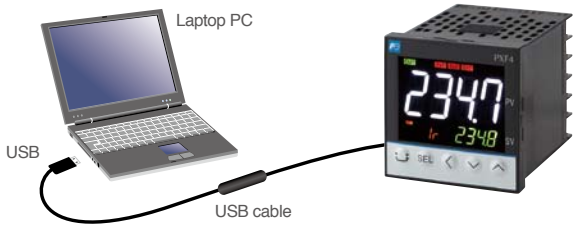
PXF9
96 x 96 mm

PXF5
48 x 96 mm

PXF4
48 x 48 mm

Parameter Setting Available on PC

Parameter loader software is download free from our website. Optional USB cable enables PXF to be connected to and powered from PC.



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