z : s y s t e m s

ZS28 SERIES

FLEXIBLE GENERAL-PURPOSE VFD



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INTRODUCTION

ZS28 series is a flexible general-purpose VFD that integrates multiple advantages to provide an excellent solution for your motor drive systems. The product offers high safety and reliability, a compact design, excellent performance, rich functionality, and ease of use. It integrates an EMC filter, safety functions, and a Type-C debugging interface, while supporting energy-saving control and multiple fieldbus communication options. It is widely applicable across industries such as machine tools, textiles, printing and packaging, food processing, lithium battery manufacturing, logistics, 3C electronics, rubber and plastics, cable production, HVAC, and more.

FEATURES

- Excellent Performance
- Extrem compactness and flexibility
- Powerful functions
- Ease of use
- Safe and reliable



POWERFUL FUNCTIONS

DUAL RATING DESIGN

Light load: overload capacity is 110% of the rated output current for 60 seconds.

Heavy load: overload capacity is 150% of the rated output current for 60 seconds.



BUILT-IN BRAKING UNIT

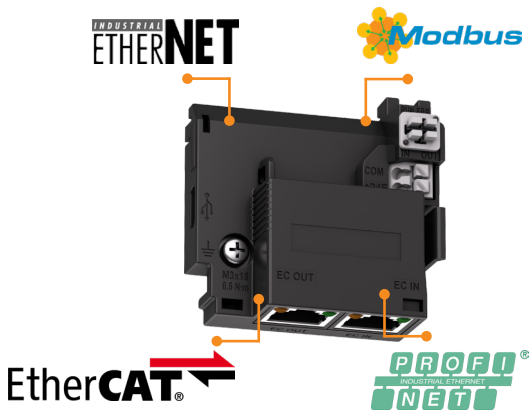
Built-in braking unit across the entire series, reducing the need for external braking devices, lowering costs, and simplifying system complexity.

MOTOR TEMPERATURE DETECTION

Supports motor temperature monitoring through digital or analog inputs, compatible with various sensor types including PTC, PT100, PT1000, and KTY84, enabling real-time motor temperature monitoring to ensure safe running

SUPPORTING MULTIPLE COMMUNICATIONS

Standard built-in Modbus RTU communication; optional all-in-one communication card integrating PROFINET, EtherCAT, EtherNet/IP, and Modbus TCP high-speed protocols, with protocol switching through software; integrated dual RJ45 interfaces for fast and reliable connections between devices using standard Ethernet cables

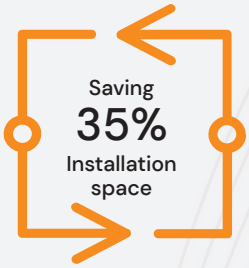


EXTREME COMPACTNESS AND FLEXIBILITY

ULTRA-COMPACT DESIGN

Compared with the previous generation, ZS28 series features a richer set of built-in functions while achieving a more compact size, saving an average of 35% in installation space and significantly improving space utilization.



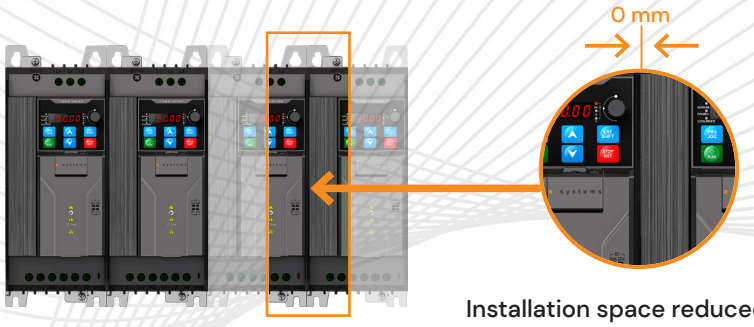


High-efficiency cooling system



SEAMLESS SIDE-BY-SIDE INSTALLATION

In environments with ambient temperatures below 40° C, seamless side-by-side installation is supported, allowing for substantial reduction of cabinet space.



Installation space reduced

SIMPLE AND FLEXIBLE INSTALLATION

ZS28 VFDs in frames A and B are small and compact, requiring only two screws for mounting, while also supporting DIN rail installation. ZS28 VFDs in frames C, D, and E support flange installation, with the heatsink mounted externally to achieve enhanced cooling performance.



ZS28 in frame A or B



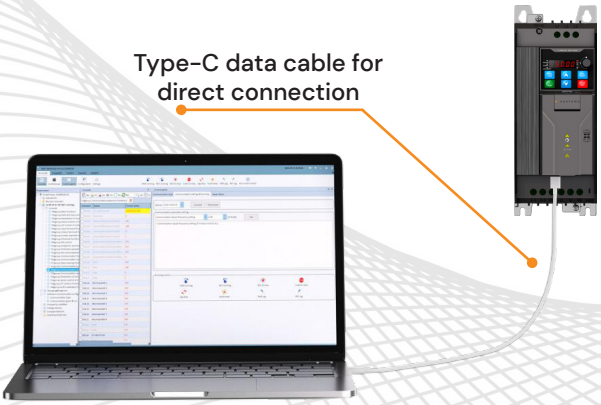
ZS28 in frame C, D or E

Note: The rail mounting bracket and flange are optional accessories.

EASY TO USE

BUILT-IN TYPE-C PORT

The product can be easily connected to a PC using a standard commercially available Type-C data cable, without the need for main power supply or a USB/ RS-485 adapter. This enables quick and convenient parameter setting, copying, and monitoring.



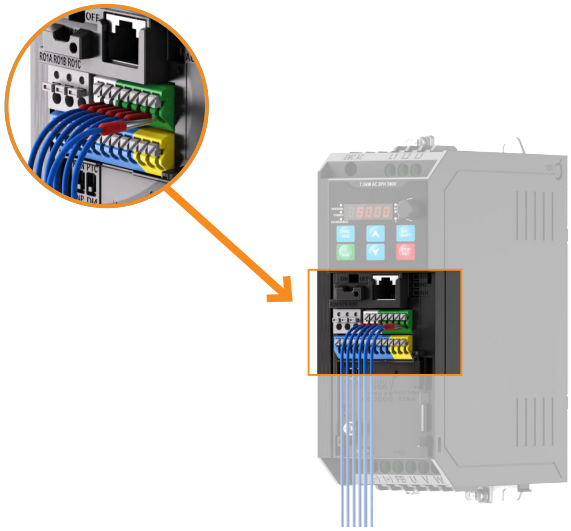
VERSATILE KEYPAD DEBUGGING OPTIONS

Built-in simple LED membrane keypad
Optional LED debugging keypad
Optional LCD debugging keypad



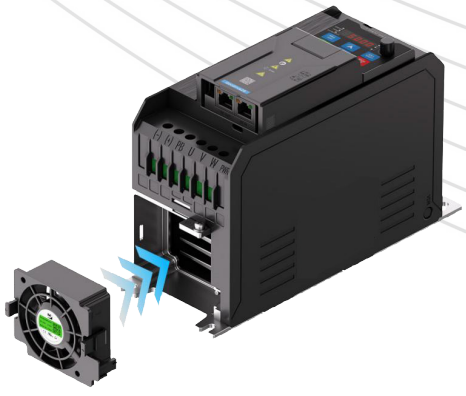
SCREW-FREE TERMINAL

Spring-loaded control terminals, implementing screw-free connection or disconnection, improving efficiency by 50%



PLUGGABLE FAN

Next-generation pluggable cooling fan,with error- proof design,ensuring quick installation or removal



OUTSTANDING PERFORMANCE

MULTI-PURPOSE APPLICATION

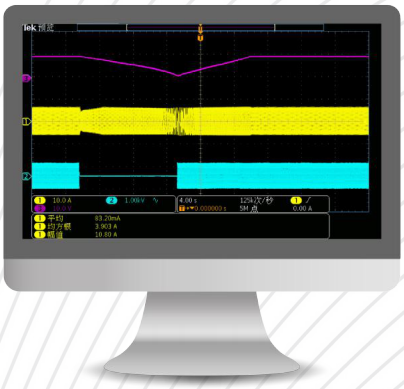
Supports both induction motors and permanent magnet motors

Supports V/F and SVC control



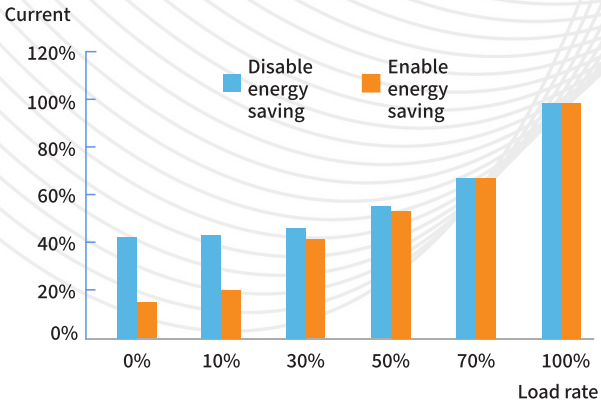
TRANSIENT POWER LOSS RIDE-THROUGH

In the event of a transient power drop, the VFD can continue to operate using the regenerated energy within the effective time frame, ensuring no downtime. Ideal for applications requiring continuous running



ENERGY-SAVING CONTROL

By enabling energy-saving control, the VFD operates with lower current under light-load conditions, further reducing equipment losses and helping customers save costs and improve efficiency.



HIGH TORQUE, FAST RESPONSE

By enabling energy-saving control, the VFD operates with lower current under light-load conditions, further reducing equipment losses and helping customers save costs and improve efficiency.

SPEED TRACKING

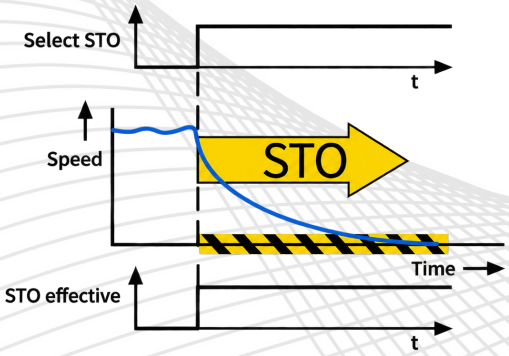
Quickly captures the motor speed for smooth and impact-free startup, improving restart efficiency, minimizing downtime loss, and ensuring continuous production

SAFE AND RELIABLE

BUILT-IN SAFETY FUNCTION

Safety torque off (STO) function compliant with international safety standards, achieving SIL3 and PL e levels.

Prevents unintended VFD startup, making equipment maintenance and operation safer.



BUILT-IN C3 FILTER

Compliant with IEC61800-3 C2 or C3 standards Effectively reduces electromagnetic interference, ensuring stable equipment running without the need for an external filter, delivering better cost efficiency.

Note: The 1PH VFDs meet the C2 standards, and the 3PH VFDs meet the C3 standards.



ROBUST ENVIRONMENTAL ADAPTABILITY

Reliable full-load running at ambient temperatures up to 50°C.
Reinforced PCB coating meets 3C2 and 3S2 environmental standards.
Independent air duct design.
Frame A features natural cooling design



GLOBAL PRODUCTS

Compliant with international standards such as CE and UL to meet global market requirements

MODEL SELECTION

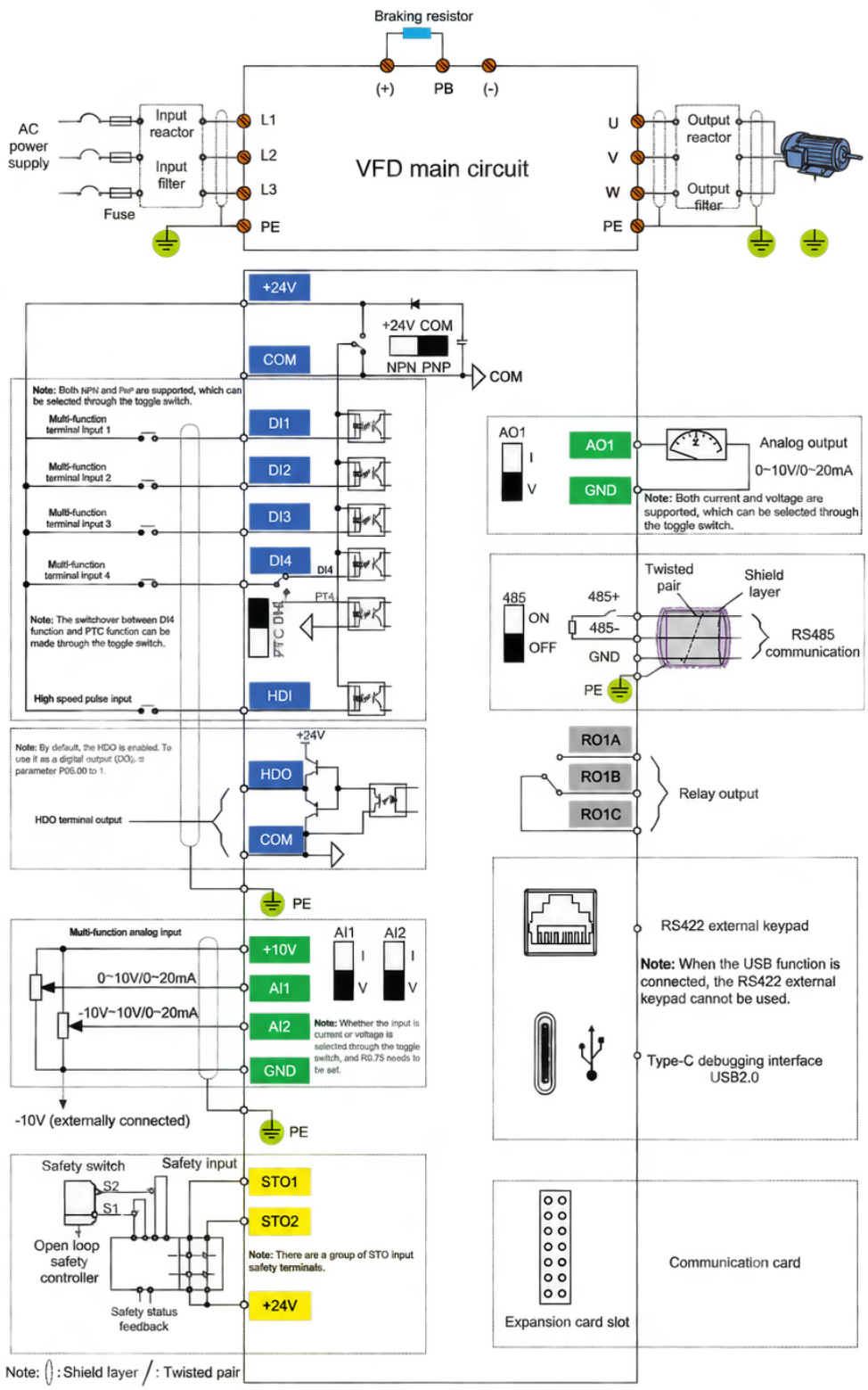
1 2 3
ZS28 - 022CL - 04

SIGN	DESCRIPTION	CONTENTS
1	Product series	ZS28: Multi VFD Frequency Inverter, Vector Control, IP20, UL certified, STO
2	Power range+ load type (refer to table Power Ratings)	e.g. 0022CL : 2.2kW @ constant torque load / heavy load xxx CL : constant torque load
3	Voltage level	01: 1PH 200V-240V Rated Voltage: 220V 02: 3PH 200V-240V Rated Voltage: 220V 04: 3PH 380V-480V Rated Voltage: 380V"

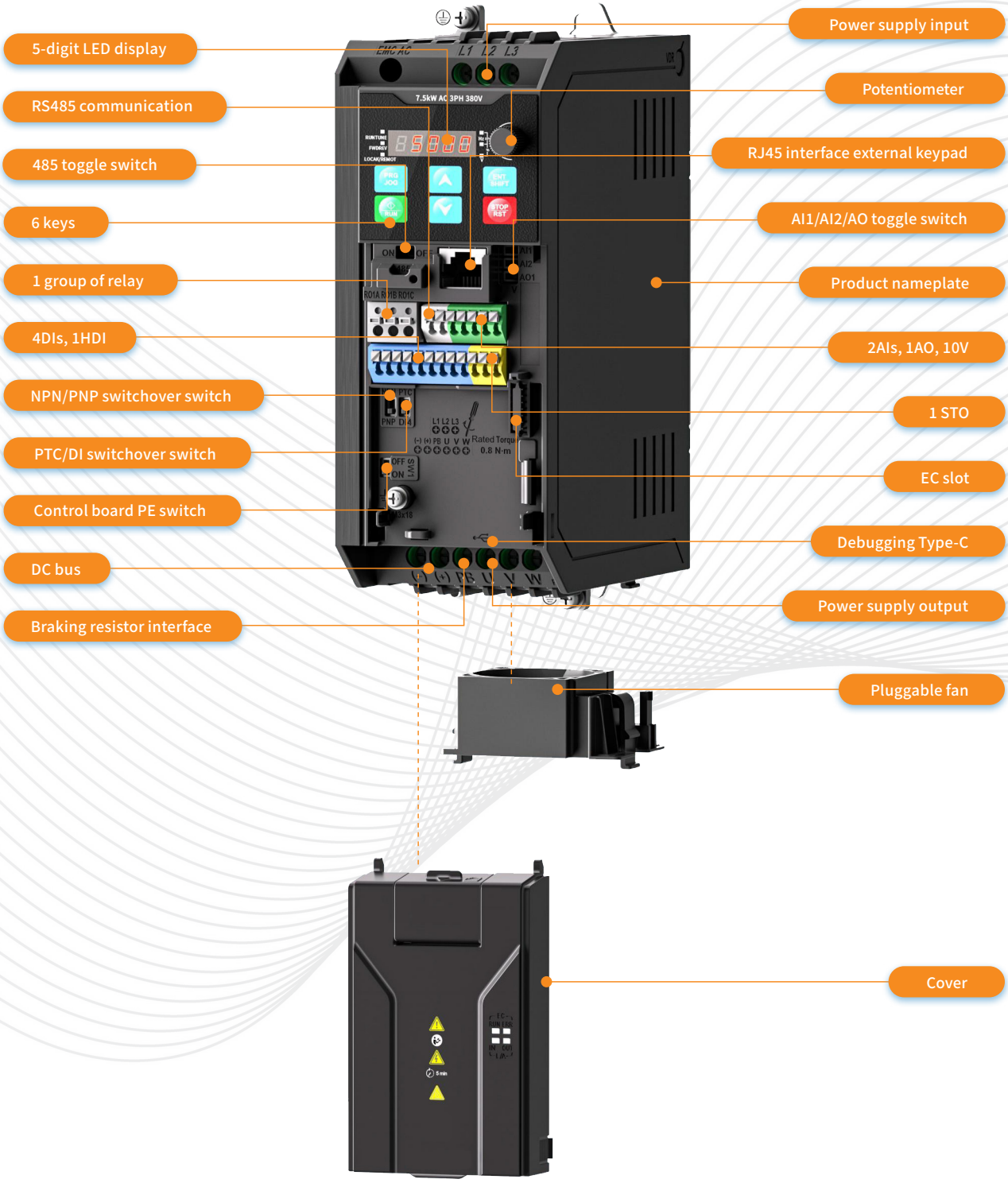
POWER RATINGS

			HEAVY LOAD			LIGHT LOAD		
VOLTAGE	MODEL	FRAME	OUTPUT POWER [kW]	OUTPUT CURRENT [A]	INPUT CURRENT [A]	OUTPUT POWER [kW]	OUTPUT CURRENT [A]	INPUT CURRENT [A]
1PH 200-240V	ZS28-0002CL-01	A	0.2	1.5	3.9	0.4	2.0	4.5
	ZS28-0004CL-01	A	0.4	2.5	5.3	0.75	3.3	7.4
	ZS28-0007CL-01	A	0.75	4.2	8.8	1.1	5.1	11
	ZS28-0011CL-01	B	1.1	6.5	14.8	1.5	7.5	17
	ZS28-0015CL-01	B	1.5	7.5	17	2.2	9.8	20.4
	ZS28-0022CL-01	B	2.2	10	20.6	3	12.5	23.8
	ZS28-0040CL-01	C	4.0	16	34	-	-	-
3PH 200-240V	ZS28-0002CL-02	A	0.2	1.5	2.2	0.4	2.0	3.3
	ZS28-0004CL-02	A	0.4	2.5	4.1	0.75	3.3	5.6
	ZS28-0007CL-02	A	0.75	4.2	6.8	1.1	5.1	8.1
	ZS28-0011CL-02	B	1.1	6.5	9.1	1.5	7.5	11.5
	ZS28-0015CL-02	B	1.5	7.5	11.5	2.2	9.8	15
	ZS28-0022CL-02	B	2.2	10	15.1	3.0	12.5	17.7
	ZS28-0040CL-02	C	4	16	20	5.5	21	26
	ZS28-0055CL-02	C	5.5	20	25.7	7.5	26	30
	ZS28-0075CL-02	D	7.5	30	33	11	39	43
	ZS28-0110CL-02	D	11	42	44	-	-	-
	ZS28-0150CL-02	E	15	55	60	18.5	64	72
3PH 380-480V	ZS28-0004CL-04	A	0.4	1.5	2.7	0.75	2.0	3.9
	ZS28-0007CL-04	A	0.75	2.5	4.5	1.1	3.3	6.0
	ZS28-0011CL-04	A	1.1	3.0	5.8	1.5	3.7	6.9
	ZS28-0015CL-04	B	1.5	4.2	7.6	2.2	5.5	9.6
	ZS28-0022CL-04	B	2.2	5.5	9.6	3.0	7.0	10.4
	ZS28-0030CL-04	B	3	7.5	11.4	4.0	9.5	15.3
	ZS28-0040CL-04	B	4	9.5	15.3	5.5	11.5	17.2
	ZS28-0055CL-04	C	5.5	14	22.1	7.5	18	27.6
	ZS28-0075CL-04	C	7.5	18.5	28	11	21	29.8
	ZS28-0110CL-04	D	11	25	36	15	32	46
	ZS28-0150CL-04	D	15	32	46	18.5	38	52
	ZS28-0185CL-04	E	18.5	38	55	22	45	60
	ZS28-0220CL-04	E	22	45	60	30	58	72

ELECTRICAL WIRING



PRODUCT APPEARANCE



BASIC SPECIFICATIONS

FUNCTION	SPECIFICATIONS
INPUT VOLTAGE	AC 1PH 200V ~ 240V AC 3PH 200V ~ 240V AC 3PH 380V ~ 480V
INPUT FREQUENCY	50Hz or 60Hz; Allowed range: 47–63Hz, with a maximum change rate of 20%/s
VFD POWER	0.2kW~22kW
OUTPUT FREQUENCY	0~599Hz
CONTROL MODE	Space voltage vector control (V/F), and sensorless vector control (SVC)
MOTOR TYPE	Asynchronous motor; permanent magnetic synchronous motor
SPEED RATIO	For asynchronous motor (AM), 1:100 (SVC); for synchronous motor (SM), 1:50 (SVC)
SPEED CONTROL ACCURACY	±0.2% (SVC)
SPEED FLUCTUATION	±0.3% (SVC)
TORQUE RESPONSE	< 10ms (SVC)
TORQUE CONTROL ACCURACY	5% (SVC)
STARTING TORQUE	For AMs: 0.5Hz/200% (SVC) For SMs: 2.5Hz/150% (SVC)
OVERLOAD CAPACITY	For heavy-load models: 150%/60s, 180%/10s For light-load models: 110%/60s, 150%/10s
BRAKING UNIT	Standard built-in braking unit
SAFETY FUNCTION	Standard built-in Safe Torque Off (STO), SIL3

STANDARD INTERFACES

FUNCTION	SPECIFICATIONS
ANALOG INPUT	2 analog inputs: AI1:0~10V/0~20mA AI2:-10~10V/0~20mA Accuracy: Full-scale accuracy of 1%
ANALOG OUTPUT	1 analog output AO1: 0~10V/0~20mA Accuracy: Full-scale accuracy of 1%
DIGITAL INPUT	4 regular inputs. Max. frequency: 1kHz 1 high-speed input. Max. frequency: 50kHz Both NPN and PNP are supported, with PNP as the default. DI4 can be switched to provide the PTC function through the toggle switch
DIGITAL OUTPUT	1 high-speed digital output. Max frequency: 50kHz Optional standard digital output, supporting both PNP and NPN modes
RELAY OUTPUT	1 programmable relay output RO1A: NO; RO1 B: RC; RO1C: common terminal Contact capacity: 3A/AC 250V, 1A/DC 30V
TYPE-C INTERFACE	It is powered by connecting to a PC through USB, allowing quick parameter viewing and configuration through host controller software without requiring the main power supply
COMMUNICATION INTERFACE	RS485 communication, supporting the Modbus RTU communication protocol
KEYPAD DISPLAY	5-digit digital tube display, with 6 keys
EXPANSION CARD	1 expansion card slot: The all-in-one communication expansion card integrates PROFINET, EtherCAT, EtherNet/IP, and Modbus TCP fieldbus protocols, and allows the communication protocol to be selected by setting parameter P24.00

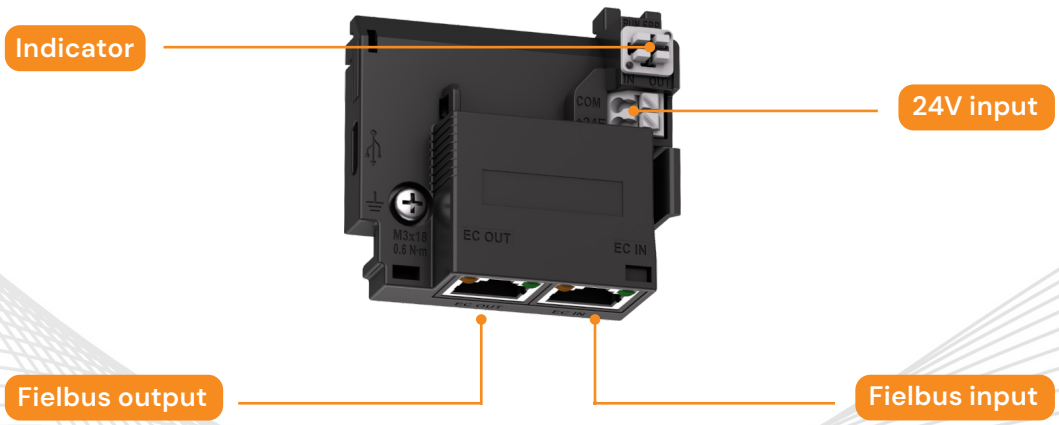
DISTINCTIVE FUNCTIONS

FUNCTION	SPECIFICATIONS
ACC/DEC CURVE SETTING	Supports linear and S-curve modes. S-curve supports separate settings for ACC and DEC smoothness.
WOBBLING FREQUENCY FUNCTION	Specifies back-and-forth frequency wobbling near the center frequency, supports separate settings for rise and fall time, and supports frequency jump.
OVERVOLTAGE STALL PROTECTION	Automatically adjusts frequency when the voltage exceeds limits to prevent overvoltage tripping.
AUTOMATIC CURRENT LIMITING PROTECTION	Automatically limits current and adjusts frequency when current exceeds limits, preventing overcurrent tripping.
FLEXIBLE DO OUTPUT	Supports output terminal inversion when any function code value exceeds the specified threshold, allowing flexible user application, such as temperature overlimit monitoring, torque reaching, current reaching, voltage reaching, and line speed reaching.
FLEXIBLE AO/HDO OUTPUT	Outputs any function code value to AO/HDO, allowing flexible user application, such as temperature monitoring, torque monitoring, and PID monitoring.
IF CONTROL	Supports IF control to enhance motor load-starting capability.
GRID VOLTAGE AND FREQUENCY SELECTION	Supports one-click setting of the VFD input voltage level and frequency.
RANDOMIZED PWM CONTROL	Reduces electromagnetic noise in special applications.
ENERGY-SAVING CONTROL	The VFD automatically seeks the most efficient operating point during actual operation, ensuring the motor operates at its highest efficiency to achieve energy savings, especially for the motor under light load conditions.
ENHANCED FLUX BRAKING	Enhances flux braking to accelerate the motor's DEC tracking process.
INERTIA IDENTIFICATION	Compensates for load inertia and enhances system responsiveness.
RS485 COMMUNICATION ADDRESS MAPPING	Supports user-defined read/write addresses to enhance the flexibility of the RS485 communication.
LOW-VOLTAGE DEBUGGING	The VFD can be disconnected from the main power and connected to a PC through the TYPE-C port to modify, save, import, and export parameters.
REMOTE UPGRADE	Supports remote OTA upgrades through IoT (requiring the optional 4G card).
AUTOMATIC VOLTAGE REGULATION (AVR)	The output voltage can be kept constant although the grid voltage changes.
SPEED TRACKING	Tracks the actual running frequency and direction, implementing smooth running without impact, and reducing equipment impact.
FREQUENCY DECIMAL PRECISION SETTING	The frequency can be set to a value with 1 or 2 decimal places, making it compatible with high-speed motor control.
FREQUENCY SETTING METHOD	Supports keypad digital setting, analog setting, multi-step speed running setting, Modbus communication setting, and so on. These settings can be combined and the setting channels can be switched.
FAULT PROTECTION	Provides comprehensive fault protection: overcurrent, overvoltage, undervoltage, overtemperature, overload, phase loss, short circuit, and other protection functions.
MOTOR OVERTEMPERATURE PROTECTION	Monitors motor temperature in real-time through DI4 (PTC) or AOAI analog combination to reduce the risk of motor overheating damage.

ENVIRONMENT CONDITION

FUNCTION	SPECIFICATIONS
PLACE OF USE	Indoors, without direct sunlight, and free from conductive dust, oil mist, corrosive gases, or water vapor. The environment should not contain radioactive, flammable, explosive materials, or salts.
RUNNING TEMPERATURE	-10°C~50°C, no derating for light load at 40°C, no derating for heavy load at 50°C
STORAGE TEMPERATURE	-20°C ~70°C
TRANSPORT TEMPERATURE	-20°C ~70°C
ALTITUDE	Max. altitude of 2000m (6562ft). For altitudes of 1000m (3281ft) and below, no derating is required. Above 1000m (3281ft), derate by 1% for every increase of 100m (328.1ft)
RELATIVE HUMIDITY (RH)	<95%RH, no condensation
VIBRATION	<0.6g
OVERVOLTAGE CATEGORY	OVC III
POLLUTION LEVEL	3C2,3S2,PD2
INGRESS PROTECTION (IP) RATING	IP20
EMC CLASS	The built-in C3 filter (15m) is standard for requirement meeting, while the optional external EMI fliter can be selected to meet C2 class requirements.
PRODUCT CERTIFICATION	UL CE TUV
MOUNTING METHOD	Wall mounting, DIN rail mounting, and flange mounting
COOLING METHOD	220V voltage class: natural cooling for 0.75kW and lower 380V voltage class: natural cooling for 1.1kW and lower Others: Forced air cooling

OPTIONAL BUS COMMUNICATION CARD



FIELDBUS PROTOCOL	FEATURES
PROFINET	Supports the PROFINET protocol and PROFINET IO devices. Supports the medium redundancy protocol (MRP). Equipped with the slave station GSDML configuration file, it can communicate with Siemens PLC and other master stations. Equipped with 2 PROFINET IO ports, supporting 100M full-duplex operation. Applicable to linear, star, and ring network topologies. Enables basic operations on VFDs, such as reading and writing process values, reading status values, and reading/writing function codes. This communication card supports up to 32 IOs.
EtherCAT	Supports the EtherCAT CiA 402 protocol. Configured with a slave station XML configuration file, it can communicate with Beckhoff PLC, INVT AX controllers, and other master stations.Automatic network address configuration. Equipped with two RJ45 ports, supporting 10/100M half/duplex operating, designated for IN and OUT directions. Supports linear, star, and ring network topologies.
INDUSTRIAL ETHERNET	Supports the EtherNet IP protocol and EtherNet IP slave nodes. Supports ODVA standards and DLR ring protocol. When configured with a slave station EDS configuration file, it can communicate with Rockwell PLC and other master stations. Equipped with EtherNet/IP ports featuring dual RJ45 interfaces, supporting 10/100M full/half-duplex operation. Applicable to linear, star, and ring network topologies. Enables basic operations on VFDs, such as reading and writing process values, reading status values, and reading/writing function codes. This communication card supports up to 32 IOs.
Modbus	Supports the Modbus TCP protocol and Modbus TCP slave stations. Supports the concurrent communication with multiple master stations. It can communicate with Schneider PLCs, INVT AX controllers, and other master stations. Equipped with two RJ45 ports, supporting 10/100M full/half-duplex operation. Supports basic operations on VFDs, such as reading and writing process values, reading status values, and reading/writing function. Supports linear and star network topologies.

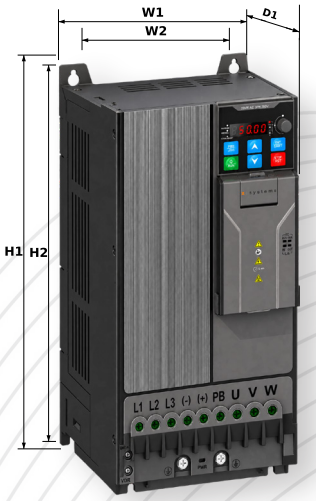
WALL MOUNTING



Frame A or B

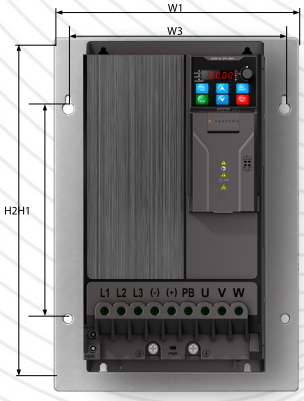


Frame C

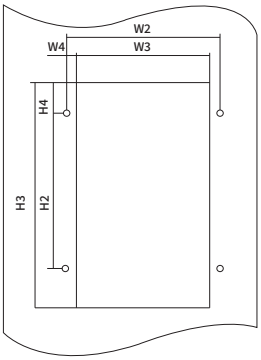


Frame D or E

FRAME	DIMENSION (mm)						WEIGHT (kg)
	W1	H1	D1	W2	H2	d	
A	60	190	155	36	180	5	1.23
B	70	190	155	36	180	5	1.27
C	90	235	155	70	220	6	2.05
D	130	250	185	100	237	6	3.55
E	160	300	190	130	287	6	4.90







Frame C, D or E

FRAME	DIMENSION (mm)											WEIGHT (kg)
	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	d	
C	130	112	93	10	265	170	255	29	155	75	6	2.05
D	190	170	150	10	275	170	252	50	185	105	6	3.55
E	220	200	180	10	325	200	302	50	190	105	6	4.90

OPTIONS

OPTION NAME	APPEARANCE	MODEL / FUNCTION / APPLICABLE TO	OPTION NAME	APPERANCE	MODEL / FUNCTION / APPLICABLE TO
LED keypad		Externally connected LED display and operation panel	DIN rail mounting bracket		Function: Used to install the VFD on the DIN rail Applicable to: VFDs inframes A and B
LCD keypad		Externally connected LCD display and operation panel	Bus communication expansion card		Function: Used to expand industrial bus communication Applicable to: All series
Keypad bracket		Function: Used to fix the external LED or LCD keypad to the electrical cabinet	The CANopen communication expansion card and IO expansion card are currently under development.		

APPEARANCE	OPTION NAME	APPEARANCE FRAME
	Flange mounting bracket-C	C
	Flange mounting bracket-D	D
	Flange mounting bracket-E	E
	Metal shielding plate kit-A	A or B
	Metal shielding plate kit-C	C
	Metal shielding plate kit-D	D
	Metal shielding plate kit-E	E
	NEMA1 junction box protection kit-A	A
	NEMA1 junction box protection kit-B	B
	NEMA1 junction box protection kit-C	C
	NEMA1 junction box protection kit-D	D
	NEMA1 junction box protection kit-E	E

z : systems

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