EFI 21

Electrim Frequency Inverter

ABOUT ELECTRIM

Electrim series of products cover mainly the MV & LV electrical motors, inverters and starter panels including industries gears & drives.

The company is committed to challenge itself to become a main player in this field. Through the years, we have maintained a policy of providing high performance products and in line with technology development.

THE MISSION

To ensure Products recognition and best status in our Market, the Company emphasize QUALITY over PRICES. We would rather explain our pricing for a while than to apologize QUALITY for a LIFE.

Thus we choose to build a BRAND for long term and not to make short term PROFIT.

Electrim offer a total system solution consisting of motors, starter & protection, inverters & gears box for the industries.

EFI 21 Electrim Frequency Inverter

Product summary

The EFI 21 Electrim frequency inverter, has a compact design, is exquisite and practical, has up to four control modes, and has an overload capacity of up to 200%. It can be widely used in the speed control of various asynchronous motors. The product relies on a 32-bit MCU and adopts the internationally leading vector control algorithm to achieve high-performance and high-precision motor drive control. While improving the reliability and environmental adaptability of the product, it strengthens the customer's ease of use and industry-specific design, with more optimized functions, more flexible applications, and more stable performance.

Product features

- Four control modes: constant torque V/F, quadratic load V/F, vector control without PG sensor, energy saving mode
- Compact design, exquisite and practical
- Overload capacity: 150% rated output current for 60s, 200% rated output current for 2s
- Built-in Modbus communication interface
- The panel can be externally connected, easy to use
- PCB coating to resist harsh application environments
- The side of the plastic shell product has a removable protective plate, which supports side-by-side installation
- High-performance vector control using flux and speed estimation technology
- Wide voltage range design ensures product adaptability to grid fluctuations
- Advanced independent air duct design, adaptable to various complex and harsh on-site environments

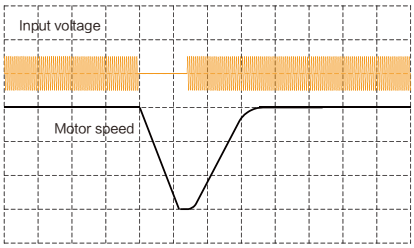
Product funtions

Random carrier wave capability

- Compared with the sharp motor noise of the fixed carrier, the output voltage harmonic spectrum of the random carrier is evenly distributed in a wider frequency range, and the noise emitted by the motor is softer.

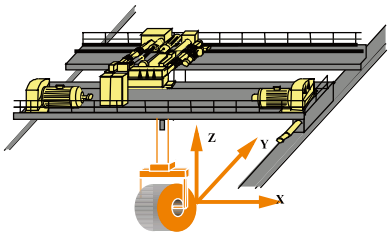
Instantaneous blackout protection

In case of instantaneous power failure or sudden decrease of input voltage, inertia energy of load side is fed back to DC bus by reducing motor speed to make up temporary energy gap, maintain DC voltage higher than undervoltage action value, and avoid shutdown due to undervoltage.



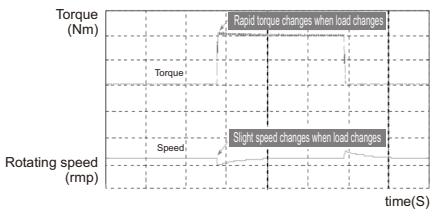
Reliable braking

- Magnetic excitation before starting, and then through frequency, current and other ways to open the brake to prevent the load slip;
- Before the stop, trigger lock brake in advance to ensure the stability of stop. Applications: Crane, Capstan.



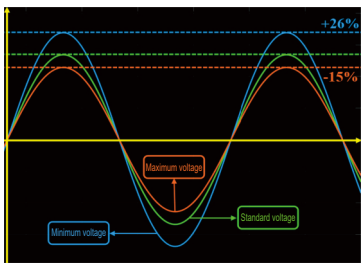
Quick Response

By improving the response speed and controlling the speed change during load disturbance, the motor speed can be kept constant to the greatest extent possible. Compared with traditional drives, the response time is shortened by more than half.



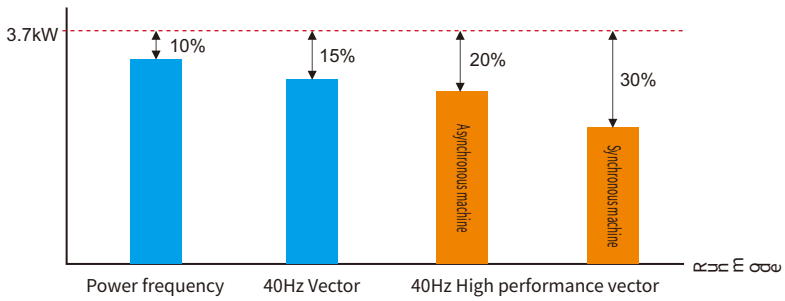
Wide voltage design

The input voltage fluctuation range is −15%~+26% of the rated voltage, which can protect the device from the impact of voltage fluctuations and meet the harsh power grid environment.



Excellent energy-saving function

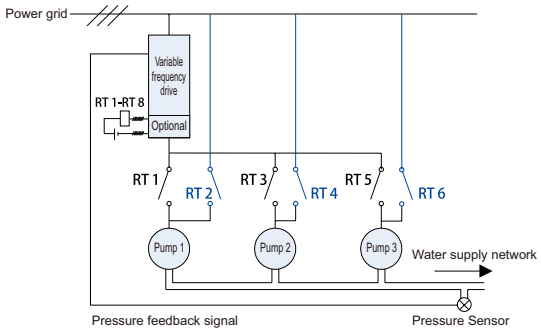
The new generation of energy-saving control technology is adopted to achieve efficient operation of induction motors; reduce the excitation current according to the load current, and automatically adjust energy saving according to the load condition; maximize the motor efficiency; reduce motor loss and energy loss. 30% asynchronous motors and synchronous machines use vector mode to drive synchronous machines, and the energy utilization rate can be increased by more than 10%.



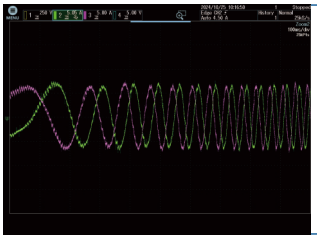
Multi-pump control function (non-standard program)

Using the built-in PID controller, multiple water pumps can be automatically switched on and off according to different pressures; the pumps can be rotated regularly to try to average the running time of each water pump; a dormant small pump can be set to ensure stable pressure at extremely low water consumption.

Note: Please specify this function when ordering

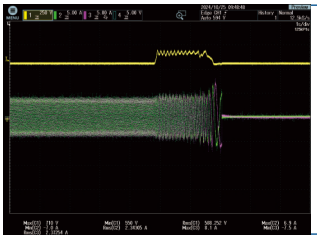


Software suppression function



- Overcurrent suppression

The current suppression function can prevent the drive from frequently giving out overcurrent alarms. When the current exceeds the current protection point, the overcurrent suppression function can continuously limit the current within the current protection point to protect the safety of the equipment and avoid overcurrent alarms caused by sudden load or interference. Reduce the losses caused by unwarranted shutdown.



- Overvoltage suppression

The overvoltage suppression function can prevent the drive from giving an overvoltage alarm during acceleration and deceleration. When the drive bus voltage reaches or exceeds the overvoltage protection point during acceleration and deceleration, the overvoltage suppression function can suppress the increase of the bus voltage by automatically adjusting the operating frequency, thereby protecting the equipment and avoiding the drive from giving an overvoltage alarm due to the increase of the bus voltage.

Application


Textile printing & dyeing


Municipal environmental protection


Ceramic machinery


Food machinery


machine tool


Packaging machinery


Logistics equipment


Woodworking machinery


Fan and Water pump


Wastewater treatment

Product structure

EMC Design

With the surge current absorption circuit, can inhibit the surge current when the power input

Ac input reactor, AC output reactor or DC reactor can be selected to greatly reduce harmonic current

EMC filter is optional to reduce interference to external equipment and meet C2 international standards

Wide Voltage Input Range

Wide voltage input range in line with international standards, allowing appropriate voltage fluctuations

Rated voltage 3-phase 400-480V, 50Hz/60Hz

Allowable voltage fluctuation range: 323V-506V, 50Hz/60Hz

Long Life Design

The key components are all made from the industry's first-class manufacturers, with long design life

Strong and Weak Electrical Isolation Design

Adopt srtong & week electrical isolation Design, to avoid magnetic field interference and increase service lift.

Three Anti-paint Automatic Spraying Process

Three anti-paint automatic spraying equipment, according to the layout characteristics of the circuit board programming spraying path, to ensure that the coating is comprehensive, uniform, good consistency. Thickened coatings can be ordered for use under particularly harsh conditions

Thermal design and thermal reliability

Independent air duct: including IGBT、rectifier bridge, electrolytic capacitor

Above 25Hz, it adopts low loss design. Peak and trough of wave 1/6 cycle non - chopper to enhance local heat dissipation design

Parts strictly adopt international standards, type test main test content

Details	Absolute allowable temperature
Transformer, IC, rectifier bridge	125 ℃
Electrolytic Capacitors	95℃
Contactor	130℃
PCB	120℃
Charging resistor	180℃
IGBT heat sink	85℃

VFD Temperature test: 40℃

Exfactory aging test: high temperature 60℃

Heat Dissipation Structure

Independent cooling duct optimization design, from the original right angle optimization to rounded corner, reduce the thermal disk accumulation, greatly increase the efficiency of heat dissipation.

Fan quick disassembly/assembly design

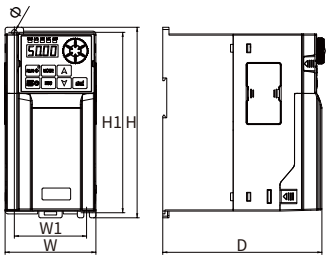
The innovative fan structure design ensures the fan's stability and efficiency, and enables the fan to be quickly replaced and cleaned without the need for external tools.

Model description

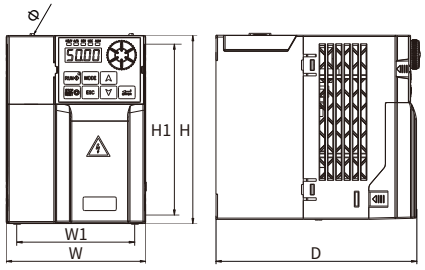
EFI 21 ① – T3 ② – 7R5 ③ G ④ / 11 ③ P ④ – E ⑤

① Product Series EFI 21: Electrim Frequency inverter	② Supply Voltage S2: single-phase 220V T3: Three-phase 400V	③ Adapted motor power 0R4 : 0.4kW 0R7 : 0.75kW 1R5 : 1.5kW 2R2 2.2kW ... ... 710 : 710kW 800 : 800kW
④ Load Type G: Overload P: Light load	⑤ Motor Type None: Asynchronous motor E: Permanent magnet synchronous motor	

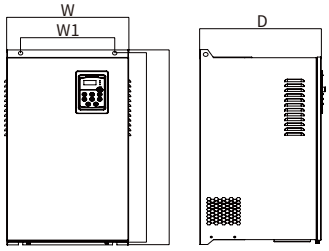
Appearance size



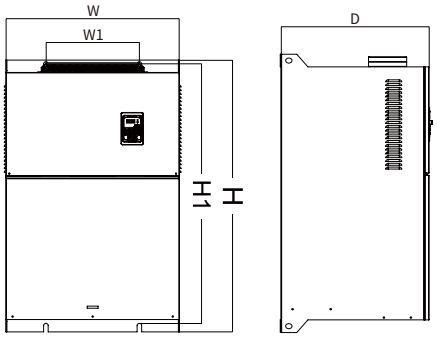
220V 0.4KW-2.2KW
400V 0.4KW-1.5KW



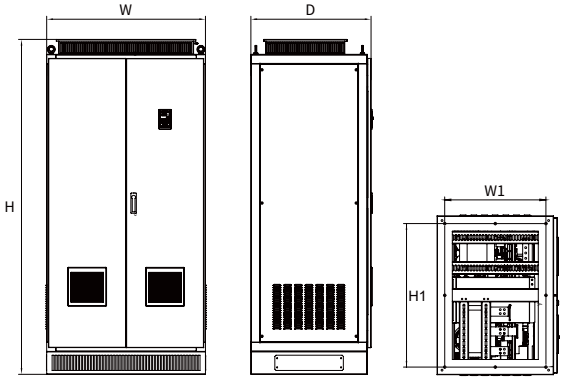
400V 2.2KW-11KW



400V 15KW-315KW



400V 350KW-500KW



400V 560KW-800KW

Model selection

Model (single-phase S2)	Adaptive motor (kW)	Rated input current (A)	Rated output current (A)	Overall dimensions(mm)			Installation Dimensions(mm)		
				H	W	D	H1	W1	Aperture
EFI 21-S2-0R4	0.4	6.3	2.5	170	81	142	161	64.5	Φ5
EFI 21-S2-0R7	0.75	11.5	5						
EFI 21-S2-1R5	1.5	15.7	7						
EFI 21-S2-2R2	2.2	27	10						

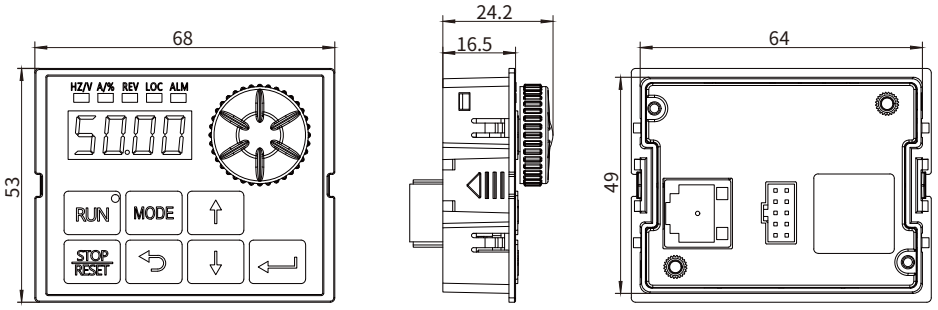
Model selection

Model (three-phase T3)	G Type (Heavy load)			P Type (Light load)			Dimension (H*W*D mm)	Installation size (H1*W1 mm)	Aperture
	Motor power (kW)	Rated input current(A)	Rated output current(A)	Motor power (kW)	Rated input current(A)	Rated output current(A)			
EFI 21-T3-0R4G/0R7P	0.4	2.1	1.5	0.75	3.6	2.6	170*81*142	161*64.5	Φ5
EFI 21-T3-0R7G/1R5P	0.75	3.6	2.6	1.5	6.4	4.1			
EFI 21-T3-1R5G/2R2P	1.5	6.4	4.1	2.2	8.7	5.5			
EFI 21-T3-2R2G/3P	2.2	8.7	5.5	3	10.9	6.9	145*107*160	135*95	Φ5
EFI 21-T3-3G/4P	3	10.9	6.9	4	14	9.5			
EFI 21-T3-4G/5R5P	4	14	9.5	5.5	20.7	12.6	200*138*145	188*124	Φ5
EFI 21-T3-5R5G/7R5P	5.5	20.7	12.6	7.5	26.5	18.5			
EFI 21-T3-7R5G/11P	7.5	26.5	18.5	11	36.6	25	232*153*171	220*139	Φ5
EFI 21-T3-11G/15P	11	36.6	25	15	40	32			
EFI 21-T3-15G/18P	15	40	32	18.5	47	38	327*168*185.6	313*120	Φ9
EFI 21-T3-18G/22P	18.5	47	38	22	56	45			
EFI 21-T3-22G/30P	22	56	45	30	70	60	335*200*190.4	321*140	Φ9
EFI 21-T3-30G/37P	30	70	60	37	80	75	410*260*214	396*180	Φ9
EFI 21-T3-37G/45P	37	80	75	45	94	92			
EFI 21-T3-45G/55P	45	94	92	55	128	115	520*288*236	500*200	Φ11
EFI 21-T3-55G/75P	55	128	115	75	160	150	563*305.6*311.8	548*200	Φ11
EFI 21-T3-75G/90P	75	160	150	90	190	180	603*310.6*309.8	588*240	Φ11
EFI 21-T3-90G/110P	90	190	180	110	225	215			
EFI 21-T3-110G/132P	110	225	215	132	265	260			
EFI 21-T3-132G/160P	132	265	260	160	310	305	720*355*345	698*240	Φ13
EFI 21-T3-160G/185P	160	310	305	185	355	350			
EFI 21-T3-185G/200P	185	355	350	200	385	380			
EFI 21-T3-200G/220P	200	385	380	220	430	425	920*480*390	898*320	Φ13
EFI 21-T3-220G/250P	220	430	425	250	485	480			
EFI 21-T3-250G/280P	250	485	480	280	545	530	1100*480*405	1078*320	Φ13
EFI 21-T3-280G/315P	280	545	530	315	610	600			
EFI 21-T3-315G/355P	315	610	600	355	665	650			
EFI 21-T3-355G	355	665	650	–	–	–	1100*650*465	1060*350	Φ17
EFI 21-T3-400G	400	785	725	–	–	–			
EFI 21-T3-500G	500	890	860	–	–	–			
EFI 21-T3-560G	560	950	950	–	–	–	2200*1100*800	943*665	Φ16
EFI 21-T3-630G	630	1100	1100	–	–	–			
EFI 21-T3-710G	710	1280	1280	–	–	–	2200*1400*800	1100*665	Φ16
EFI 21-T3-800G	800	1380	1380	–	–	–			

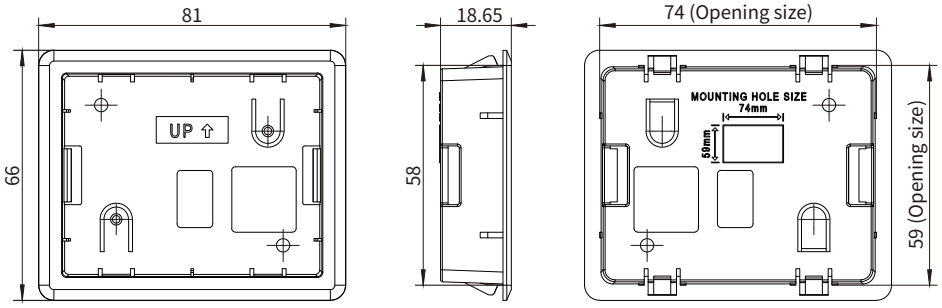
Note: If the product is used for permanent magnet synchronous motor, please add code "E" to the order model.

External lead panel

• Plastic shell panel

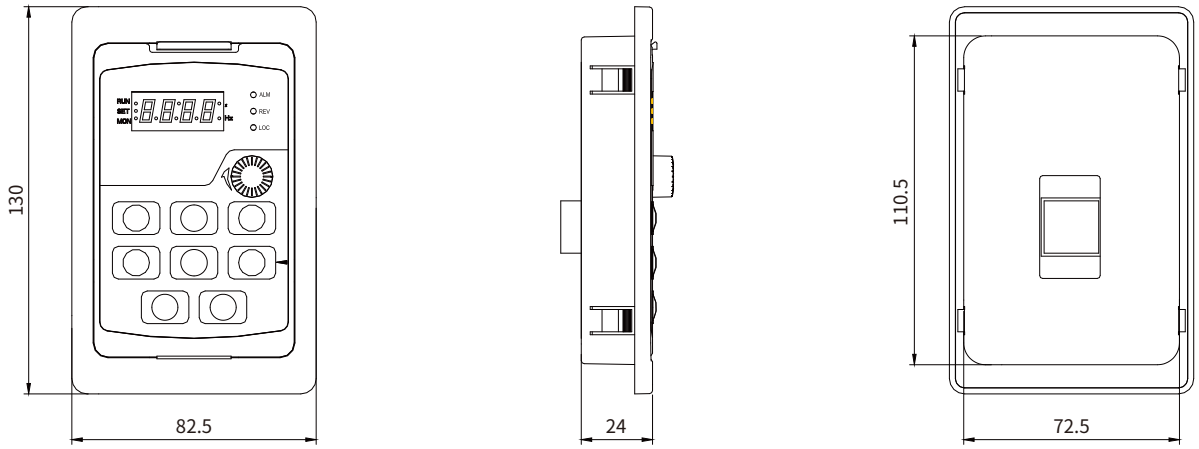


Panel size



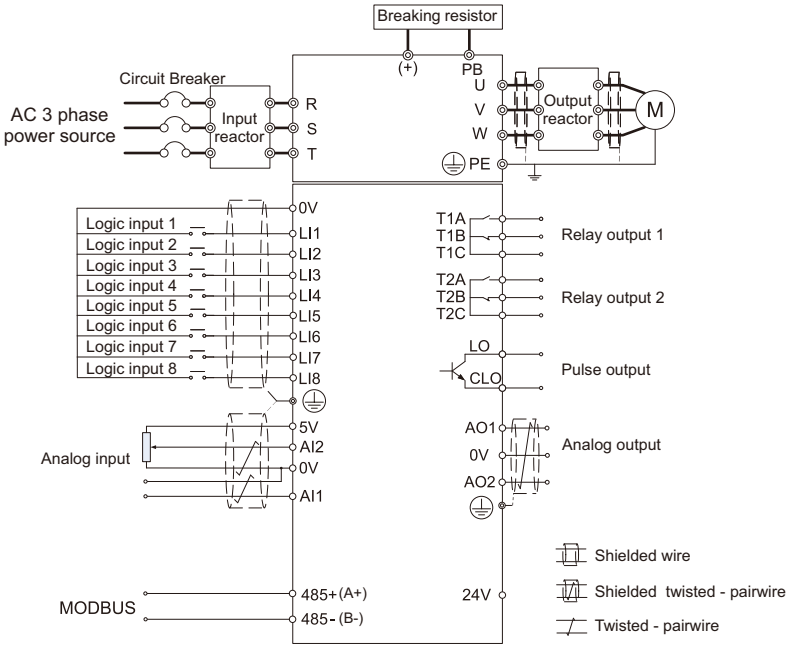
Panel external lead bracket

• Iron shell panel

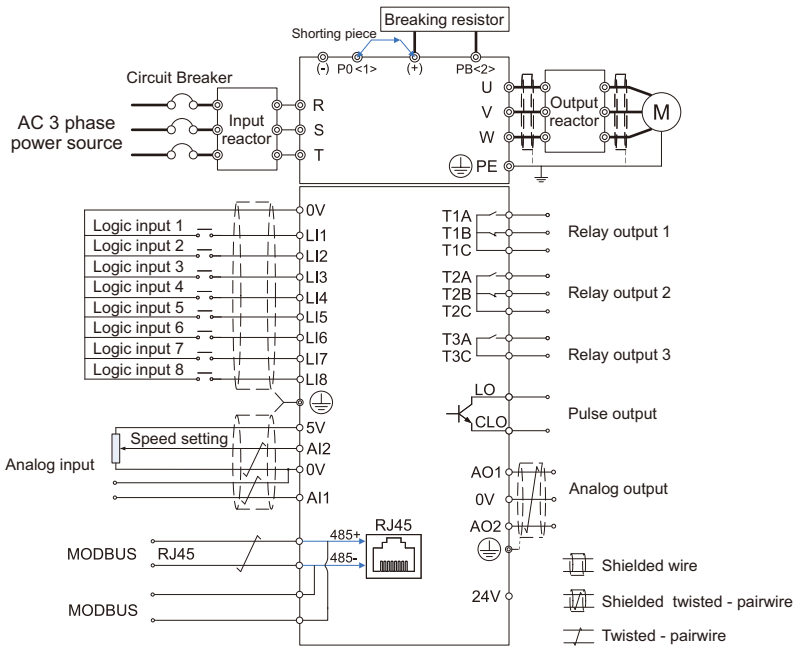


Standard wiring diagram

- EFI 21 series 400V (T3) 2.2kW~11kW



- EFI 21 series 400V (T3) 15kW~800kW



<1> The 15kW drive does not have a P0 terminal; for drives above 45kW (inclusive), be sure to remove the short-circuit between P0 and (+) when installing the DC reactor (optional).

<2> The 15kW drive has a PB terminal, and a brake resistor can be connected between PB and (+).

Note: The figure shows the standard wiring diagram of some models of EFI 21 series. Please consult customer service for standard wiring diagrams of other power models.

Performance & configuration

Basic application functions	
Low frequency torque boost	The voltage boost and torque boost can increase the low-frequency torque of V/F control and speed sensorless vector control by about 0.1%~30.0% respectively.
V/F Curve	Linear type, multi-point type
Acceleration and deceleration curve	Linear or S-shaped acceleration and deceleration; three sets of acceleration and deceleration time; acceleration and deceleration time range: 0-3200s
Automatic Voltage Regulation (AVR)	When the grid voltage changes, it can automatically keep the output voltage constant
Built-in PID	Closed-loop control system that can easily realize process control
DC braking	DC braking range: 0.0Hz-maximum frequency; braking time: 0.0s-20.0s Braking action current value: 0%-100%
Jog control	The motor can be started and stopped immediately; the inching frequency setting range is: 0.0-20.0Hz Inching stop mode: deceleration/free/DC braking
Frequency Hopping	You can set 3 frequency hopping points and the corresponding frequency hopping range to prevent the drive from running within the frequency band.
Multi-speed	Up to 15 operating frequencies can be set via 4 logic input ports
Input Sum	The algebraic operation result of 2 analog inputs is used as the frequency setting, making the frequency setting more flexible
2 sets of motor parameter switching	Two sets of motor parameters can be set and switched freely to match the currently driven motor
Drive protection	Input/output phase loss protection, underload detection, over-torque protection, undervoltage protection, overvoltage protection, overcurrent protection, overheating protection, phase short circuit protection
Motor protection	Motor thermal protection, motor current limiting, motor overload, motor short circuit

Electrical characteristics	
Input voltage	3-phase AC, 400V (-5%~+20%), 50/60Hz 1-phase AC, (200-240)V (-15%~+10%), 50/60Hz
Output voltage	0-100% input voltage, 0.5Hz - 400Hz
Control Mode	Constant torque V/F, quadratic load V/F, sensorless vector control, energy-saving mode
On-off level	1.5kHz - 12kHz The automatic switching frequency adjustment function can be set: when the temperature rises, the switching frequency is automatically reduced After the temperature returns to normal, the switching frequency returns to the initial value
Overcurrent capability	150% rated output current for 60s, 200% rated output current for 2s

Control signal		
Frequency setting signal	Integrated operating panel	Membrane switch (button), speed knob (potentiometer)
	External Signal	UP/DOWN setting, analog input, multi-speed, external panel, serial communication
Start-stop control signal	Integrated operating panel	RUN, STOP buttons
	External Signal	Logic input terminal, external panel, serial communication

Protective function	
Drive protection	Input phase loss protection, output phase loss protection, underload detection, over-torque protection, undervoltage protection, overvoltage protection, overcurrent protection, overheating protection, phase short circuit protection
Motor protection	Motor thermal protection, motor current limiting, motor overload, motor short circuit

Control circuit characteristics		
Internal power supply available	10V 24V	10VDC ±5%, maximum current 10mA, for reference potentiometer 24VDC ±5%, maximum current 100mA, for logic input port
Analog Input	AI1	Voltage analog input: 0-5VDC, or 0-10VDC, impedance 30k Current analog input: 0/4-20mADC, impedance 250Ω Resolution: 10-bit A/D conversion Factory default setting: 0-5VDC voltage input
	AI2	Voltage analog input: 0-10VDC, or PTC probe input Resolution: 10-bit A/D conversion
Logic Input	LI1-LI8	0-24VDC power supply Positive logic (source), negative logic (sink) are optional, the factory default is negative logic 69 functions are available, including forward, reverse, running, fault reset, multi-speed, etc. 220V 0.4kw-2.2kw and 400V 0.4kw-0.75kw products only have 6 circuits: LI1-LI6
	AI1、AI2 Enforce valid input	In drives below 11kW (inclusive), AI1 and AI2 can be set as logic inputs. f309 and f310 are mandatory valid inputs, and their configuration functions are always valid during power-on.
Analog Output	AO1、AO2	Voltage analog output: 0-10VDC, minimum load impedance is 470Ω Current analog output: 0/4-20mA, maximum load impedance is 700Ω Resolution: 8 bits Output frequency, output current, speed setting, serial output data Multiple functions available 220V 0.4kw-2.2kw and 400V 0.4kw-0.75kw products only have 1 analog output, namely AO1
Logic Output	LO、CLO	Open collector, maximum current 100mA, maximum voltage 30VDC Logic output or pulse output is optional, the factory default setting is logic output Output frequency, output current, speed setting and other output functions are optional
Relay output	T1A、T1B、T1C T2A、T2B、T2C T3A、T3C	T1A is normally open, T1B is normally closed, T1C is a common point T2A is normally open, T2B is normally closed, T2C is a common point T3A is normally open, T3C is a common point Contact rating: 5A @ 250VAC, 5A @ 30VDC Fault, alarm, set frequency arrival and other functions are optional T1A defaults to failure, T2A defaults to operation 220V 0.4kw-2.2kw and 400V 0.4kw-0.75kw products only have 1 relay output, namely TA-TB-TC
Serial Communication		MODBUS-RTU, 2-wire RS-485, terminal interface

Environmental characteristics			
Protection level	IP20	environment humidity	95% no condensation or water accumulation
Working temperature/storage temperature	-10~40℃ /-20~60℃	Altitude	Below 1000m
cooling method	Forced air cooling	Installation location	Indoor

Electrim Frequency Inverter