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Product improvement is a continuous process. For the latest information and special applications, please contact any of our offices listed here.



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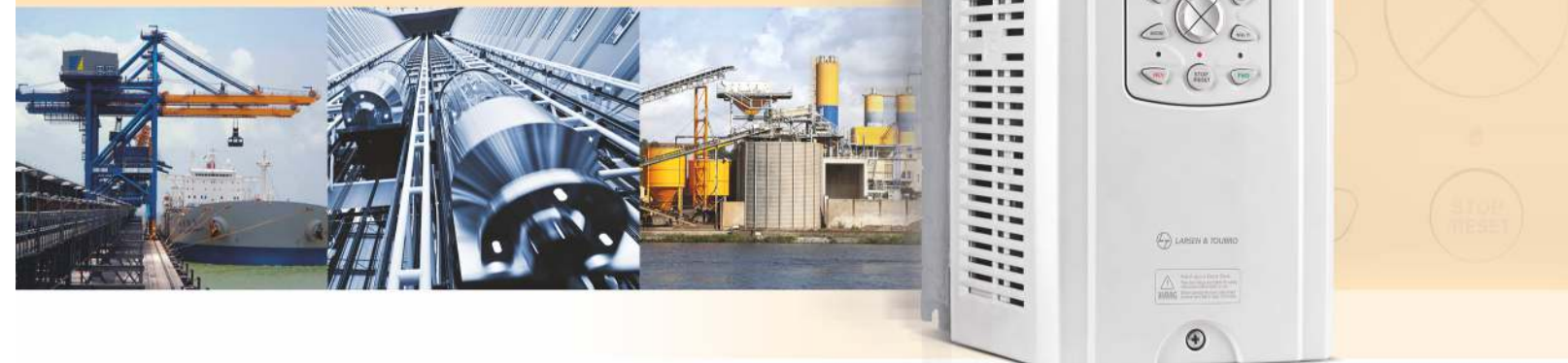
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High on flexibility
big on reliability



Fx2000 AC Drive

Three-Phase 415V (0.75 ~ 450 kW)



Two decades of application knowledge

For over two decades, various industry sectors have been reaping the benefits of L&T's cost-effective, performance-oriented AC Drive solutions. L&T's grasp of the specific needs of each industry enables it to offer application-specific solutions for various industries – such as processing, textile, plastic, ceramic, pharmaceutical, elevator, oil & gas, power, cement and material-handling.



Fx2000 AC Drive

➤ The new **reliability** edge

The Fx2000 adds a new dimension to L&T's AC drive solutions. Built to L&T's stringent quality standards, the Fx2000 is tested and certified to meet global benchmarks, thus giving you the assurance of total reliability.

The Fx2000 generates powerful performance and meets your precise needs through several features: superior V/F control, V/F PG, slip compensation and sensorless vector control as well as closed-loop vector control. It has a user-friendly interface and environment-friendly features, including a wide graphic LCD keypad, user and macro-

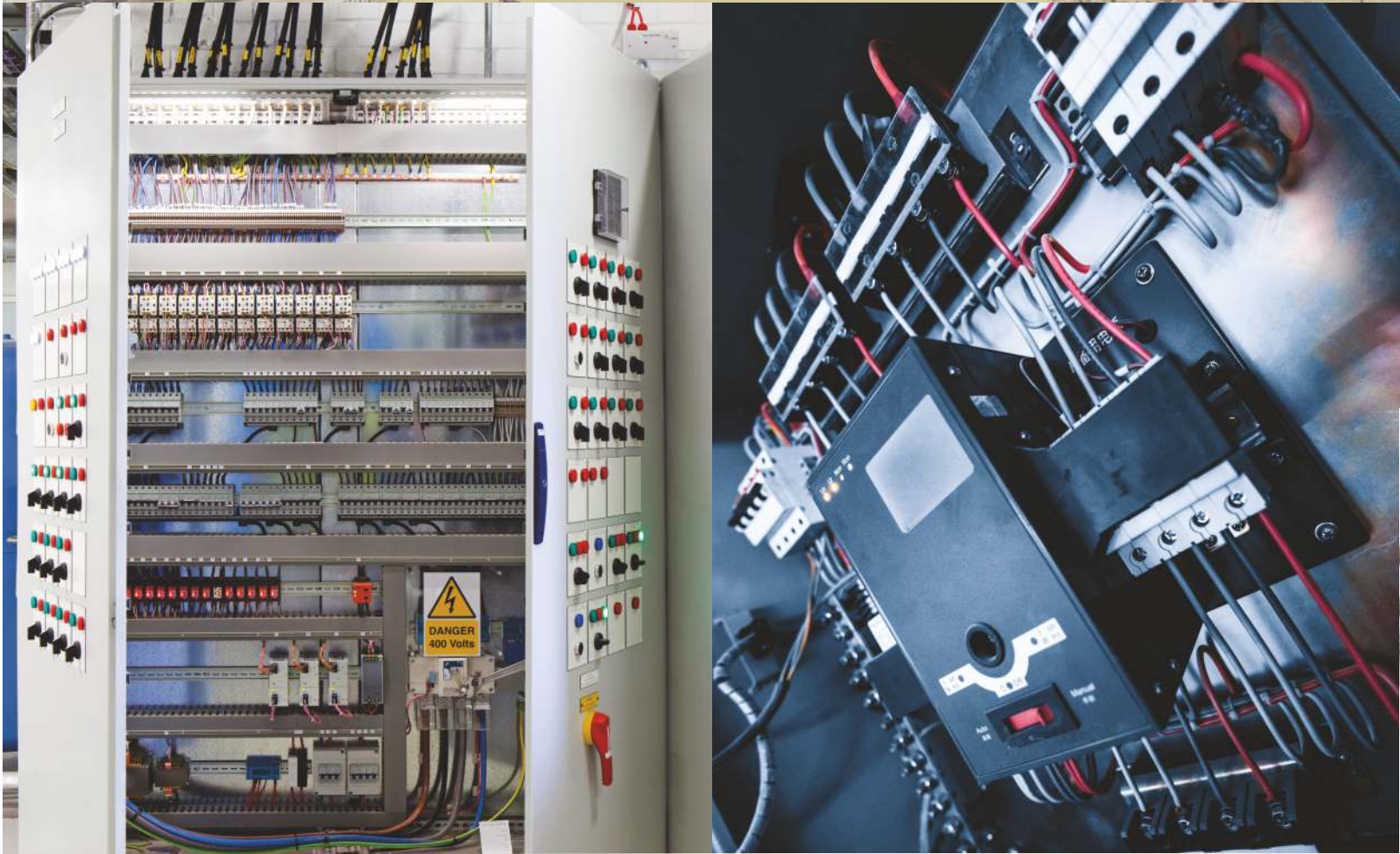
group support, electro-thermal functions for motor protection, and protection for input/output phase loss.

The Fx2000 is perfectly suited for the toughest, most complex applications – cranes, plastic winders, high-speed elevators, cement kilns, crushers... and more. It handles loads up to 375 kW - HD / 450 kW - ND, and is engineered to keep your machine operating at optimum efficiency, even in the hot, humid and dusty conditions that characterize India's industrial environment.



➤ Meeting your needs, solving your problems

We believe in addressing your needs and not just selling a product. That's why a dedicated Solutions Team first focuses on understanding your application. Then helps you select the drive that best meets your needs. Our advice on installation, maintenance and replacement will ensure that your machines function at peak productivity. From engineer to repair technician, our people have the knowledge and skill-sets to deliver total peace of mind.



➤ Backed by engineering knowledge across seven decades

A knowledge-based company, L&T brings you the benefits of over 75 years of engineering experience and expertise, and the richness of its collaborations with technology leaders across the globe.

For 50 years, L&T's low-tension switchgear – India's widest range – has been the preferred option of top industrial houses countrywide.





Tested. Certified. Reliable.

L&T is one of the few switchgear manufacturers in India with a dedicated, NABL-certified testing facility. Our products are tested for conformity to standards that exceed minimum requirements, giving you the assurance of high-quality performance. Our focus on continuous improvement ensures that our standards are on par with the best in the world. Repeat orders endorse the value that we deliver.

The reliability of the Fx2000 is ensured by international test certification – UL, CE and RoHS.

Ready Spares

➤ **After-sales service** aimed at maximum uptime

A malfunction of the drive can bring an entire assembly line or process to a halt. To ensure maximum uptime for you, our Rapid Response service team is available to analyze the situation and help you set the problem right. We have set up strategic service centres across the country to provide temporary replacement drives or ready spares to ensure that your business keeps running smoothly.

Rapid Response Service Team



➤ **Training your people** to enhance your operations

At our countrywide Switchgear Training Centres, we can train your operators, electricians and supervisors to increase their effectiveness in the operation, maintenance and trouble-shooting of your drives. We can also conduct in-plant training and workshops at your premises to improve both power management and equipment maintenance skills. This gives you total operational excellence, minimising downtime.

L&T's engineers and channel partners also upgrade their skills through seminars, workshops, training sessions and white papers on electrical practices.

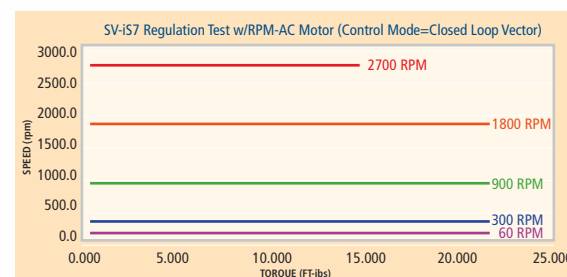
Features that ensure performance

- 250% starting torque in closed loop
- Built-in Macros for Crane, Wobblulation etc
- Winder Application
- Auto Sequence
- Draw Mode
- VFD Bypass
- Smart PLC
- Built-in RS485 MODBUS Communication

Closed Loop Vector realizing precise speed/torque control

In the entire speed range including zero speed, powerful torque (more than 250%) performance is materialized through receiving Max. 200kHz frequency pulse via an encoder-dedicated board.

- Speed control range 1000:1
- Instant Max. torque control capability 250%
- 50Hz speed control response



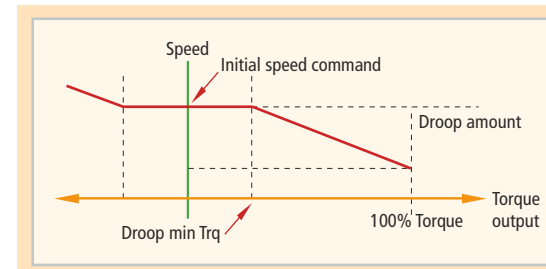
Fx2000

Flexible, reliable and powerful

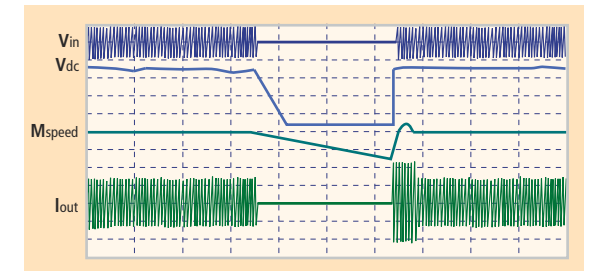
User-friendly, environment-friendly, perfectly suited for the toughest, most complex applications

Automatic Torque Balance droop control

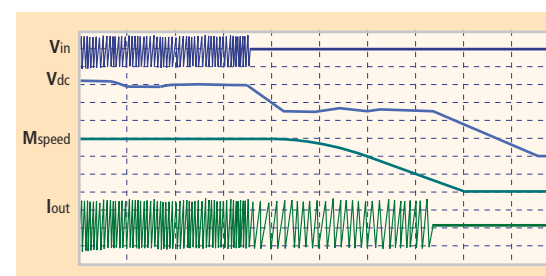
Droop control algorithm adjusts changeable torque driven by speed. This algorithm is easily applicable to open-loop linking driving and load sharing driving.



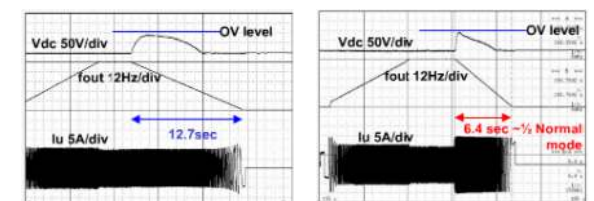
Ride-through (LV trip delay) for sudden power loss



Kinetic Energy Buffering (KEB) for a stable system stop in case of power loss or failure



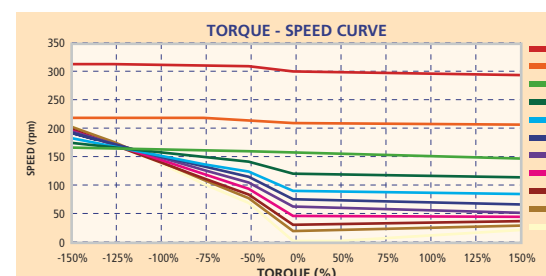
Power and flux braking for maximum deceleration



Powerful current sensorless vector control

Our Fx2000 technology includes a competitive and strong low-speed torque control and a speed-precision-driven vector algorithm.

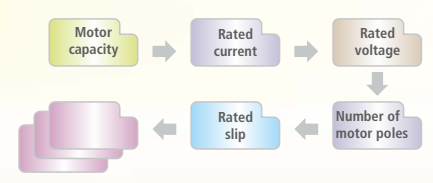
- Speed control range 100:1
- Extremely low torque control capability: 0.1Hz/150% real torque
- Max. torque control capability within the restoration range



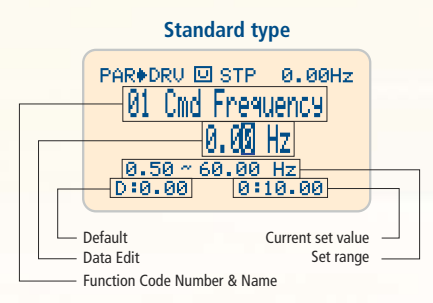


Convenience Environment

Easy-start parameter setting

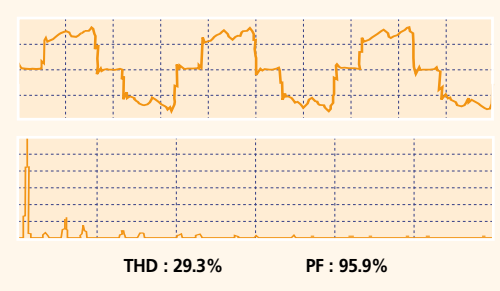


Wide viewing-angle graphic LCD keypad

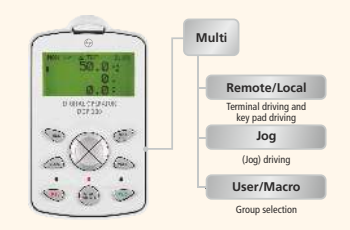


DC reactor built-in for harmonic reduction and power factor improvement

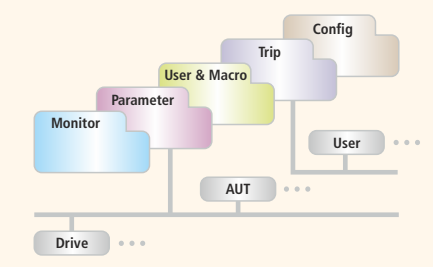
Overloading rate	110% (VT rated standard)
THD	18 ~ 37%
power factor	94 ~ 96%



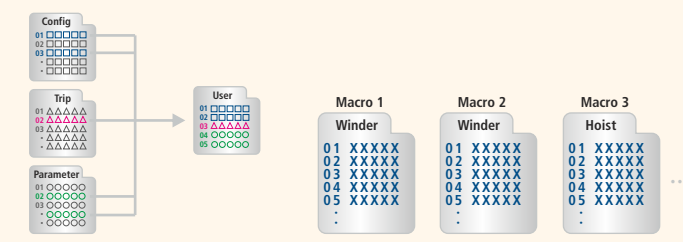
Multi-function key



Efficient architecture of 5-mode 15-parameter groups

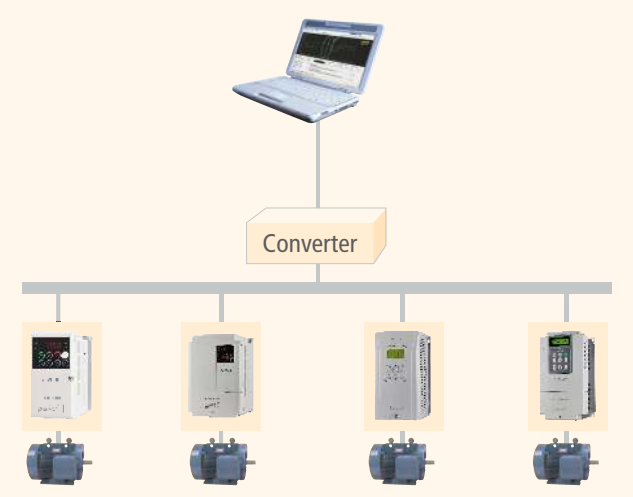


User & Macro group support



PC-based software for Easy Maintenance of Drive & Motor Parameters

- DriveConnect** software allows drive/system monitoring on a PC and easy maintenance of drive and motor parameters
- Windows-based graphic user interface (GUI)
 - Modbus-RTU
 - Connecting up to 31 drives
 - Integrated control console
 - Offline editing function
 - Data upload/download
 - 4-channel oscilloscope
 - Trigger function



Specifications

Rated Input and Output: Input voltage of 415V (0.75~22kW - HD)

Type : LTVF-F4XXXX□AA		4	6	8	12	16	24	30	39	45	61	
¹⁾ Motor Applied (kW)	HD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	
	ND	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	
Rated Output	²⁾ Rated Current [A]	HD	2.5	4	6	8	12	16	24	30	39	45
		ND	4	6	8	12	16	24	30	39	45	61
	³⁾ Rated Capacity [kVA]		1.9	3	4.5	6.1	9.1	12.2	18.3	22.9	29.7	34.3
	Output Frequency		⁴⁾ 0 ~ 400 [Hz] (Sensorless-1: 0~300Hz, Sensorless-2, Vector: 0.1~120Hz)									
Output Voltage [V]		⁵⁾ 3-phase 380 ~ 480V										
Rated Input	Available Voltage [V]		3-phase 380 ~ 480 VAC (-15%, +10%)									
	Input Frequency		50 ~ 60 [Hz] (±5%)									
	Rated Current [A]	HD	2.2	3.6	5.5	7.5	11	14.4	22	26.6	35.6	41.6
ND		3.7	5.7	7.7	11.1	14.7	21.9	26.4	35.5	41.1	55.7	

Rated Input and Output: Input voltage of 415V (30~375kW - HD)

Type : LTVF-F4XXXX□AA		75	91	110	152	183	223	264	325	370	432	547	613	731	877	
¹⁾ Motor Applied (kW)	HD	30	37	45	55	75	90	110	132	160	185	220	280	315	375	
	ND	37	45	55	75	90	110	132	160	185	220	280	315	375	415	
Rated Output	²⁾ Rated Capacity [kVA]-HD		46	57	69	84	116	139	170	201	248	286	329	416	467	557
	³⁾ Rated Current[A]	HD	61	75	91	110	152	183	223	264	325	370	432	547	613	731
		ND	75	91	110	152	183	223	264	325	370	432	547	613	731	877
	Output Frequency		⁴⁾ 0 ~ 400 [Hz] (Sensorless-1: 0~300Hz, Sensorless-2, Vector: 0~120Hz)													
Output Voltage [V]		⁵⁾ 3-phase 380 ~ 480V														
Rated Input	Available Voltage [V]		3-phase 380 ~ 480 VAC (-15%, +10%)													
	Input Frequency		50 ~ 60 [Hz] (±5%)													
	Rated Current [A]	HD	55.5	67.9	82.4	102.6	143.4	174.7	213.5	255.6	316.3	404	466	605	674	798
ND		67.5	81.7	101.8	143.6	173.4	212.9	254.2	315.3	359.3	463	590	673	796	948	

1) Motor Applied indicates the maximum capacity applied to use of a standard 4 pole standard motor.

2) Rated capacity : the input capacity of a 200V class is based on 220V and that of a 400V class is based on 440V. The current rating is based on CT current.

3) The output of rated current is limited according to setting of the carrier frequency (CON-04).

4) In case of Sensorless-1, you can set the frequency at up to 300Hz by selecting 3, 4 as the control mode (DRV-09 Control Mode).

In case of Sensorless-2, you can set the frequency at up to 120Hz by selecting 3, 4 as the control mode (DRV-09 Control Mode).

5) The maximum output voltage does not go up over the supplied power voltage. You can select the output voltage as you want below the supplied power voltage.

Control

Control Method	V/F control, V/F PG, slip compensation, sensorless vector control, vector control, closed loop vector control
Frequency Setting Resolution	Digital command: 0.01Hz Analog command: 0.05Hz (maximum frequency: 50Hz)
Frequency Tolerance	Digital command operation: 0.01% of the maximum frequency Analog command operation: 0.1% of the maximum frequency
V/F Pattern	Linear, double reduction, user V/F
Overload Capacity	HD current rating :150% for 1 minute, 200% for 3 seconds, ND current rating :110% for 1 minute
Torque Boost	Manual torque boost, automatic torque boost

Specifications

Operating Method	Selectable among keypad/terminal block/communication operation	
Frequency Setting	Analog: 0 ~ 10[V], -10 ~ 10[V], 0 ~ 20 [mA] Digital: keypad	
Operating Functions	PID control, up-down operation, 3-wire operation, DC break, frequency limit, frequency jump, second function, slip compensation, reverse rotation prevention, auto restarting, inverter by-pass, auto tuning flying start, energy-buffering, power breaking, flux breaking, leakage current reduction, MMC, easy start.	
Input	NPN (Sink) / PNP (Source) selectable	
	Multi-function terminal (8 points) P1 ~ P81	Function: forward operation, reverse operation, reset, external trip, emergency stop, jog operation, sequential frequency-high/medium/low, multi-level acceleration and deceleration - high/medium/low, D.C. control during stop, selection of a second motor, frequency increase, frequency decrease, 3-wire operation, change to general operation during PID operation, main inverter body operation during option operation, analog command frequency fixation, acceleration and deceleration stop selectable.
Output	Analog input	-10 to 10 Vdc: 1 No. 4 ~ 20 mA: 1 No.
	Multi-function open collector terminal	Failure output and inverter operation output
Output	Multi-function relay terminal	Below DC 46V 100mA Below (N.O., N.C.) AC 250V 1A, Below DC 30V 1A
	Analog output	0 ~ 10 V & 4 to 20 mA

Protective Functions

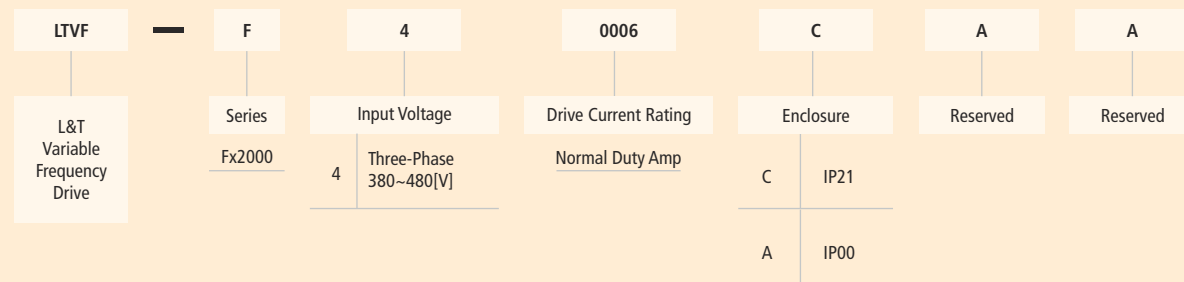
Output	Over voltage, low voltage, over current, earth current detection, inverter overheat, motor overheating, output imaging, overload protection, communication error, frequency command loss, hardware failure, cooling fan failure, pre-PID failure, no motor trip, external break trip, etc
Alarm	Stall prevention, overload, light load, encoder error, fan failure, keypad command loss, speed command loss.

Structure and Use Environment

Cooling Method	Forced cooling : 0.75~15kW (230/415V), 22kW (415V) Inhalation cooling : 22~75kW (230V), 30~375kW (415V)
Protection Degree	0.75~75kW(400V): Open type IP 21 (default) 90~375kW(400V): Open type IP 00 (default)
Ambient Temperature	- CT (Heavy Duty) load : - 10 ~ 50°C (without ice or frost) - VT (Normal Duty) load : - 10 ~ 40°C (without ice or frost) [However, recommended to use load at 80% when using at 50°C in case of Normal Duty]
Preservation Temperature	-20C ~ 65°C
Surrounding Humidity	Below 90% RH of relative humidity (with no dew formation)
Altitude, Vibration	Below 1,000m, below 5.9m/sec ² (0.6G)
Environment	There should be no corrosive gas, flammable gas, oil mist, etc. (Pollution degree 2 environment)

Model and Type

Motor Rating (Heavy duty)	Three-Phase 415V	ND / HD Current (A)
0.75kW	LTVF-F40004CAA	4 / 2.5
1.5kW	LTVF-F40006CAA	6 / 4
2.2kW	LTVF-F40008CAA	8 / 6
3.7kW	LTVF-F40012CAA	12 / 8
5.5kW	LTVF-F40016CAA	16 / 12
7.5kW	LTVF-F40024CAA	24 / 16
11kW	LTVF-F40030CAA	30 / 24
15kW	LTVF-F40039CAA	39 / 30
18.5kW	LTVF-F40045CAA	45 / 39
22kW	LTVF-F40061CAA	61 / 45
30kW	LTVF-F40075CAA	75 / 61
37kW	LTVF-F40091CAA	91 / 75
45kW	LTVF-F40110CAA	110 / 91
55kW	LTVF-F40152CAA	152 / 110
75kW	LTVF-F40183CAA	183 / 152
90kW	LTVF-F40223AAA	223 / 183
110kW	LTVF-F40264AAA	264 / 223
132kW	LTVF-F40325AAA	325 / 264
160kW	LTVF-F40370AAA	370 / 325
185kW	LTVF-F40432AAA	432 / 370
220kW	LTVF-F40547AAA	547 / 432
280kW	LTVF-F40613AAA	613 / 547
315kW	LTVF-F40731AAA	731 / 613
375kW	LTVF-F40877AAA	877 / 731



Peripheral Devices

MCCB (Moulded Case Circuit Breaker) and MC (Magnetic Contactor)

Drive Cat. No.	MCCB (L&T)		MC Amp (L&T)
	(HD)	(ND)	
LTVF-F40004CAA	DM16/4	DM16/7.5	MO 9
LTVF-F40006CAA	DM16/7.5	DM16/12	MO 9
LTVF-F40008CAA	DM16/12	DM16/16	MO 12
LTVF-F40012CAA	DM16/16	DM100/25	MO 25
LTVF-F40016CAA	DM100/25	DM100/30	MO 25
LTVF-F40024CAA	DM100/30	DM100/50	MO 32
LTVF-F40030CAA	DM100/50	DM100/50	MO 50
LTVF-F40039CAA	DM100/50	DM100/70	MO 70
LTVF-F40045CAA	DM100/70	DM100/80	MO 80
LTVF-F40061CAA	DM100/80	DN2-250M/100	MO 95
LTVF-F40075CAA	DN2-250M/100	DN2-250M/125	MXN 140
LTVF-F40091CAA	DN2-250M/125	DN2-250M/160	MXN 185
LTVF-F40110CAA	DN2-250M/160	DN2-250M/200	MXN 225
LTVF-F40152CAA	DN2-250M/200	DN3-400M/320	MXN 325
LTVF-F40183CAA	DN2-250M/250	DN3-400M/320	MXN 400
LTVF-F40223AAA	DN3-400M/320	DN3-400M/400	MXN 550
LTVF-F40264AAA	DN3-400M/400	DN3-630M/500	MXN 650
LTVF-F40325AAA	DN3-630M/500	DN3-630M/630	MXN 650
LTVF-F40370AAA	DN3-630M/630	DTH800/800	800
LTVF-F40432AAA	DTH800/800	C-Power ACB/1000	1000
LTVF-F40547AAA	C-Power ACB/1000	C-Power ACB/1250	1250
LTVF-F40613AAA	C-Power ACB/1250	C-Power ACB/1250	1250
LTVF-F40731AAA	C-Power ACB/1250	C-Power ACB/1600	1600
LTVF-F40877AAA	C-Power ACB/1600	C-Power ACB/2000	2000

Warning 1) MC (Magnetic Contactor) current is 1.5 ~ 2 times of Drives rated current.
 2) MCCB should be used to protect against overload and damage of drive installation from the fault current (The Fx2000 has overload capacity of 150% for one minute).

AC Reactor & Braking Resistor Specifications

Drive Cat. No.	Applied Motor Heavy Duty kW	Specification of AC Reactor				Dynamic Braking Unit		Specification of Braking resistor		
		Heavy Duty		Normal Duty		DBU Cat. No.	Quantity	DBR Ohms [Ω] - Wattage [W]	Quantity	
		mH	A	mH	A					
LTVF-F40004CAA	0.75	8.63	2.8	4.81	4.8	Built-in	600 Ω - 150 W	1		
LTVF-F40006CAA	1.5	4.81	4.8	3.23	7.5		300 Ω - 300 W	1		
LTVF-F40008CAA	2.2	3.23	7.5	2.34	10		200 Ω - 400 W	1		
LTVF-F40012CAA	3.7	2.34	10	1.22	15		130 Ω - 600 W	1		
LTVF-F40016CAA	5.5	1.22	15	1.14	20		85 Ω - 1000 W	1		
LTVF-F40024CAA	7.5	1.14	20	0.81	30		60 Ω - 1200 W	1		
LTVF-F40030CAA	11	0.81	30	0.61	38		40 Ω - 2400 W	1		
LTVF-F40039CAA	15	0.61	38	0.45	50		30 Ω - 2400 W	1		
LTVF-F40045CAA	18.5	0.45	50	0.39	58		20 Ω - 3600 W	1		
LTVF-F40061CAA	22	0.39	58	0.287	80		20 Ω - 3600 W	1		
LTVF-F40075CAA	30	0.287	80	0.232	98		LTDBU-0370	1	16.9 Ω - 6400 W	1
LTVF-F40091CAA	37	0.232	98	0.195	118		LTDBU-0370	1	16.9 Ω - 6400 W	1
LTVF-F40110CAA	45	0.195	118	0.157	142		LTDBU-0550	1	11.4 Ω - 9600 W	1
LTVF-F40152CAA	55	0.157	142	0.122	196	LTDBU-0550	1	11.4 Ω - 9600 W	1	
LTVF-F40183CAA	75	0.122	196	0.096	237	LTDBU-0750	1	8.4 Ω - 12800 W	1	
LTVF-F40223AAA	90	0.096	237	0.081	289	LTDBU-0550	2	11.4 Ω - 9600 W	2	
LTVF-F40264AAA	110	0.081	289	0.069	341	LTDBU-0750	2	8.4 Ω - 12800 W	2	
LTVF-F40325AAA	132	0.069	341	0.057	420	LTDBU-0750	2	8.4 Ω - 12800 W	2	
LTVF-F40370AAA	160	0.057	420	0.042	558	LTDBU-0750	3	8.4 Ω - 12800 W	3	
LTVF-F40432AAA	185	0.042	558	0.042	558	LTDBU-0750	3	8.4 Ω - 12800 W	3	
LTVF-F40547AAA	220	0.042	558	0.029	799	LTDBU-0750	3	8.4 Ω - 12800 W	3	
LTVF-F40613AAA	280	0.029	799	0.029	799	For specifications please contact nearest branch office				
LTVF-F40731AAA	315	0.029	799	0.024	952					
LTVF-F40877AAA	375	0.024	952	0.024	952					

Note : Values of DBU-DBR are based on following considerations,
Drives with inbuilt DBU :Braking torque = 150% max, Enable Duty (% ED) = 5%. In case 10% ED DBR wattage should be double
Drives with external DBU, average braking torque will be 100% max with 10 % ED

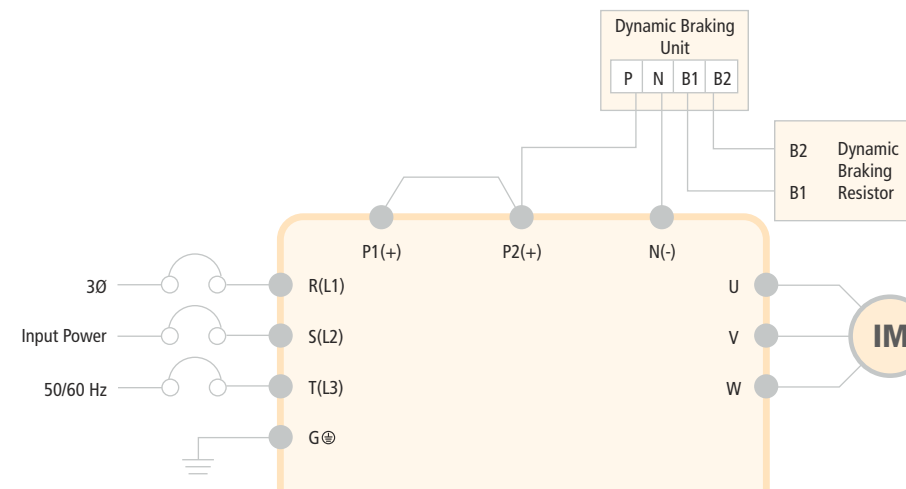
Terminal arrangement of Dynamic Braking Unit



Terminals	Functions
G	Ground Terminal
B2	Terminal for connection with B2 of DBU
B1	Terminal for connection with B1 of DBU
N	Terminal for connection with N of Drive
P	Terminal for connection with P1 of Drive

* Note: Read DBU user manual carefully when selecting DB resistors.

Dynamic Braking Unit (DBU) & Dynamic Braking Resistor (DBR) wiring layout



DBU Terminals	Description
B1, B2	Wire correctly referring to diagram. Connect DB Resistor to B1, B2 of DB unit.

Flexibility (Optional cards)

PLC Card (LTAD-PLC-F)

- Master-K 120S platform
- Normal input 6 points (Sink/Source selectable), Max. input 14 points when expanded
- Normal output 4 points (N.O. Relay), Max. output 7 points when expanded
- RTC (Real Time Clock)
- KGL WIN operating system



Encoder Card (LTEN-INC-F)

- Closed loop control
- Pulse train reference
- 5/12/15 V insulated power supply
- Line driver or open collector
- 200kHz max. input frequency
- Signal loss detection



Profibus-DP Card (LTCI-PDP-F)

- Profibus dedicated connector
- Max. 12Mbps communication speed
- Max. 32 stations per segment
- Bus topology
- Enhanced on-line diagnosis



I/O Expansion Card (LTI-EX1-F)

- Ext-1
- Digital input-3 points
- Analog voltage (-10~10V) I/O 1 point
- Analog current (0~20mV) I/O 1 point



Ethernet Card (LTCI-ETH-F)

- Modbus TCP, Ethernet IP Protocol support
- 10Mbps, 100Mbps communication speed
- Half duplex, full duplex support
- Auto negotiation
- Max. 100m(328 ft.) transmission distance
- CSMA/CD communication access method
- Analog voltage (-10~10V) I/O 2 points
- Analog current (0~20mV) I/O 2 points



DeviceNet (LTCI-DEN-F)

- Communication speed:125kbps, 250kbps, 500kbps
- tree/Bus topology
- Max. 64 node connection points
- Max. 500m (1640 ft.) transmission distance (125kbps)



CANopen Card (LTCI-CAN-F)

- 1Mbps communication speed
- Bus Topology
- Max. 64 node connection points (include master)
- PDO, SDO, Sync, NMC communication support
- Support profile:
 - PDO1 (CiA402 drive & motion control device profile)
 - PDO3 (LS Profile)



Synchronization Option Card (LTCN-SYN-F)

- Closed loop control
- 100kHz max. input frequency
- Position/Speed synchronization
- Synchronization hold (only slave)
- 15 slaves per master (3 serial - 5 parallel max)
- Open collector output: 26V/100mA (2 points)



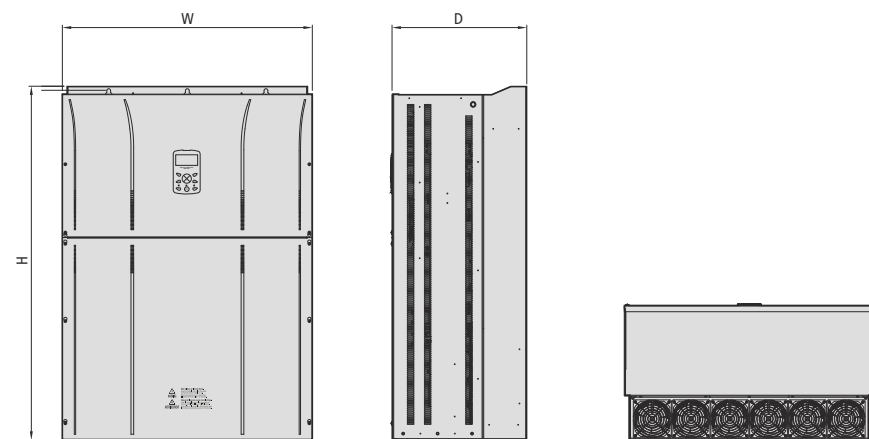
Position Control Option Card

- Closed-loop control
- Pulse train reference
- 5/12/15V insulated power supply
- Line driver or open collector
- 200kHz max. input frequency
- Signal loss detection
- External brake control



Three-Phase 415 V

Drive Cat No	W (mm)	H (mm)	D (mm)	Weight (kg)
LTVF-F40004CAA	150.0	284.0	200.0	4.8
LTVF-F40006CAA	150.0	284.0	200.0	4.8
LTVF-F40008CAA	150.0	284.0	200.0	4.8
LTVF-F40012CAA	150.0	284.0	200.0	4.8
LTVF-F40016CAA	200.0	355.0	225.0	8.0
LTVF-F40024CAA	200.0	355.0	225.0	8.0
LTVF-F40030CAA	250.0	385.0	284.0	14.3
LTVF-F40039CAA	250.0	385.0	284.0	14.3
LTVF-F40045CAA	280.0	461.0	298.0	20.0
LTVF-F40061CAA	280.0	461.0	298.0	30.3
LTVF-F40075CAA	300.1	594.1	303.2	41.3
LTVF-F40091CAA	300.1	594.1	303.2	41.3
LTVF-F40110CAA	300.1	594.1	303.2	41.3
LTVF-F40152CAA	370.1	663.5	373.3	63.3
LTVF-F40183CAA	370.1	663.5	373.3	63.3
LTVF-F40223AAA	510.0	783.5	422.6	101.3
LTVF-F40264AAA	510.0	783.5	422.6	101.0
LTVF-F40325AAA	510.0	861.0	422.6	114.0
LTVF-F40370AAA	510.0	861.0	422.6	114.0
LTVF-F40432AAA	690.0	1,078.0	450.0	200.0
LTVF-F40547AAA	690.0	1,078.0	450.0	200.0
LTVF-F40613AAA	771.0	1,138.0	440.0	252.0
LTVF-F40731AAA	922.0	1,302.5	495.0	352.0
LTVF-F40877AAA	922.0	1,302.5	495.0	352.0



Note: The above images are solely for reference purposes. Please refer to the technical manual.