

➤ Based on **experience**
Backed by commitment



x2000 Series AC Drive



X2000



WARNING
 Risk of Injury or Electric Shock.
 Read the manual and follow the safety instructions before install or use.
 Before opening the cover, disconnect all power and wait at least 10 minutes.



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The new **reliability** edge

x2000 AC Drive Series

Over 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.





➤ **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 mandatory requirements, giving you the assurance of high-quality performance. Our focus on continuous improvement ensures that our quality is on par with the best in the world. Repeat orders endorse the value that we deliver.

The reliability of the **x2000** is ensured by international test certification – UL, CE and RoHS.



› **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.



› **Training your people**
to enhance your operations

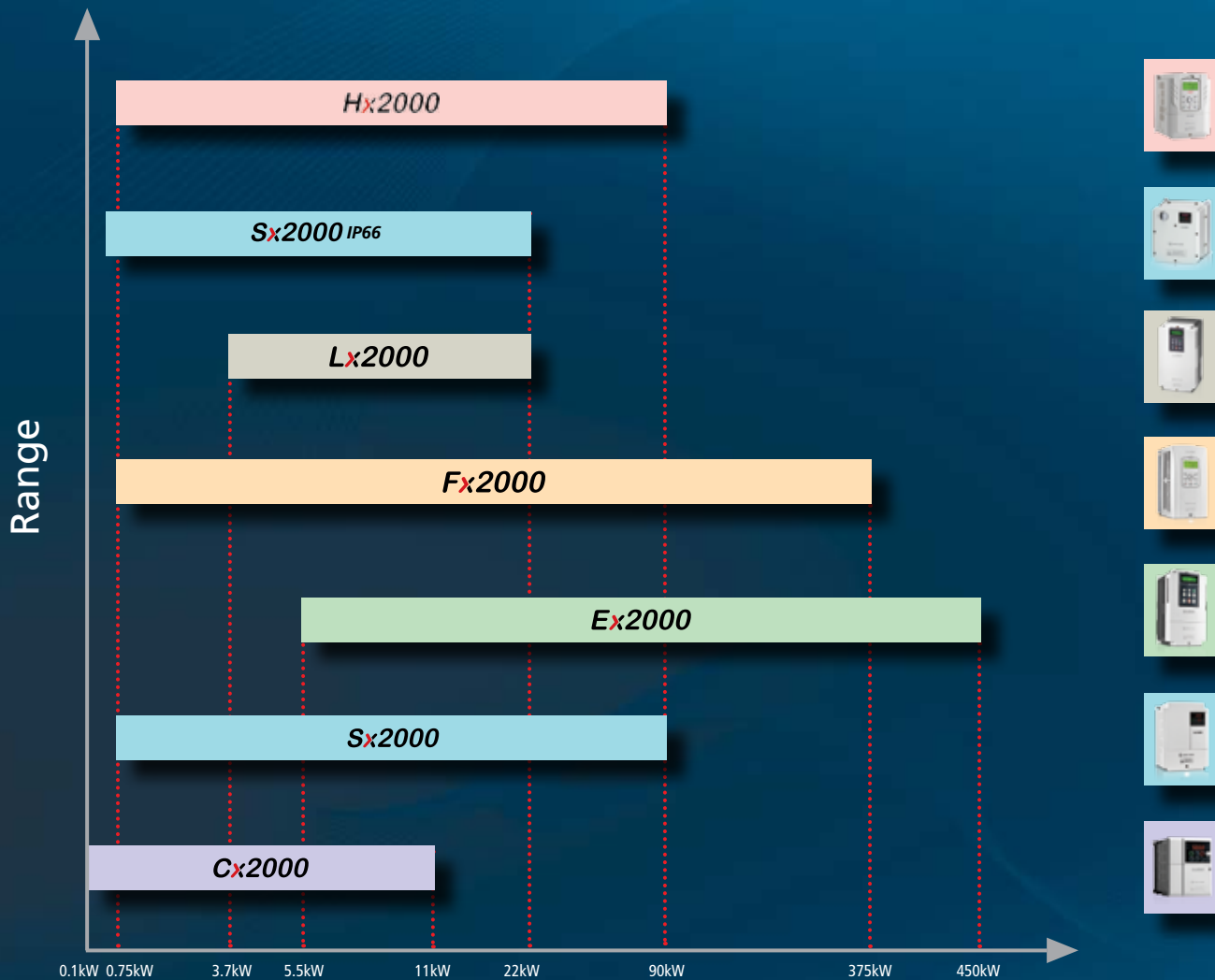
At our countrywide Switchgear Training Centres, we can train your operators, electricians and supervisors to increase their effectiveness in the operation and maintenance and trouble-shooting of your drives. We can also conduct in-plant training and workshops at your premises to improve both power management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



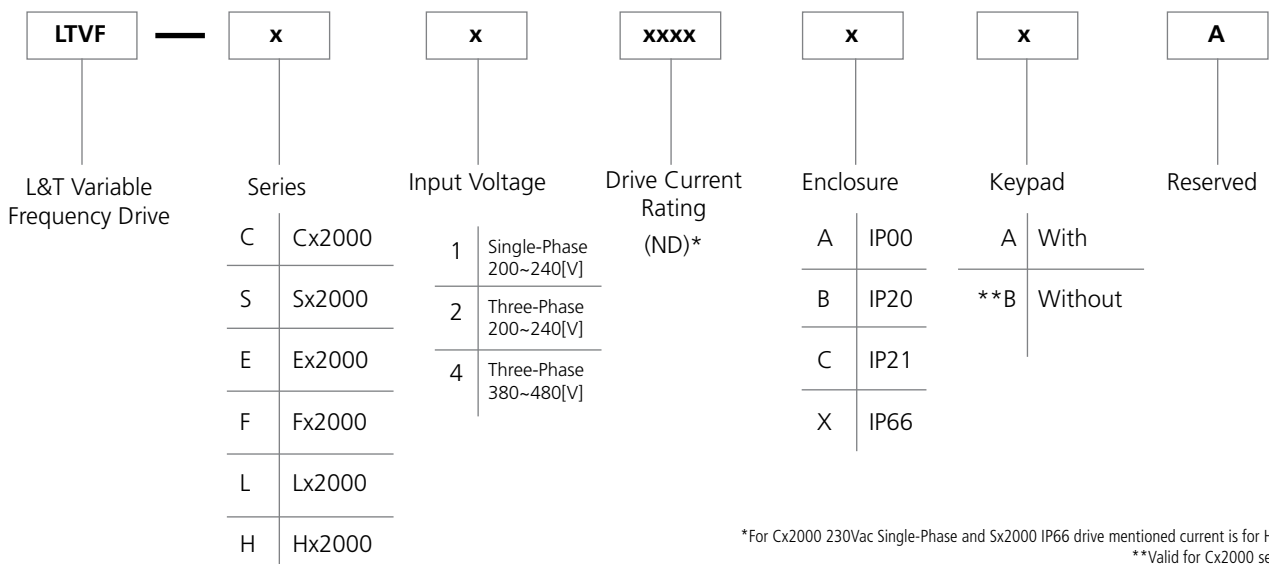
AC Drives

Salient Features	Advantages	Benefits
Built-in 24V Power Source	Reduced wiring & no need of external SMPS	No extra cost & space for SMPS & its mounting
Built-in potentiometer	No need of external potentiometer, possible to add reference from keypad and external signal	No extra expenditure of external potentiometer, simple panel wiring and no panel cut-out
Conformal Coating	Complies to IEC 60721-3-3 class 3C2. Improves life of electronic circuit in harsh environments, even reduces downtime	Increased life of drive
Booster Pump Control	Maintains desired pressure or flow by operating pumps run by conventional starters	Saving on cost of external controller
User Sequence (PLC Functionality)	It creates a simple sequence from a combination of different function blocks. No software required to create logic.	Saving on cost of external hardware or extra PLC
Multi Keypad	One master keypad can monitor/program 16 slave drives	Saving on cost of external display for slave drives
Peer-to-Peer Communication	Allows the drives to share any I/O via inbuilt RS485 communication	Saving on cost of external I/O expansion card
Sleep & Wake PID Function	Automatically switches OFF the drive during user-programmed low-load conditions and then to startup again when process demand increases	Energy-saving as well as saving on wear and tear of mechanical system
Draw Mode	Maintains the tension in process line applications by means of draw ratios	Savings in external hardware cost
Brake Control	Provides external brake control function for vertical load such as crane & elevator	Improves safety
Pre PID	Performs a general acceleration until the set frequency is reached	No extra hardware required
2nd Motor Operation	Single AC drive can maintain two motor parameters connected to two different loads, different accel / deaccl time, motor current & protection for both the motors	For isolated operation of motors one VFD can be used in place of two
Built-in Chopper	Ease of wiring, saves space	No external DBU required, hence reduced cost
Built-in DC Reactor	Reduced harmonics and improved power factor	No external reactor required
Built-in Safety Circuit	If a machine needs to stop in an emergency, circuit will block the drive output.	Additional human & machine safety
Removable Terminal Block	Control card of the existing drive can be replaced to new drive without removing control wiring	Reduces downtime for AC drive replacement
Component Life Monitoring	Digital output can be triggered when components eg. capacitor have completed their lifespan	Pre-alarm for capacitor failure, avoiding breakdown
Enhanced Cooling Design	Suction structure for internal cooling system enhances their protection and improves the life of drive in dusty working environment	Improves operating life of IGBT & AC drive
RS485 Modbus Communication	Ease of communication with 3rd party devices on MODBUS	No extra communication card required
RoHS-compliant	Complies to EU Directive 2002/95/EC stands for restriction of hazardous substances	Lead-free products, environment-friendly
No Motor Detection	Drive trips when all the 3 phases are disconnected	Useful protection in overhauling applications running with external mechanical brake



1-Phase 230V 0.1 to 2.2kW (HD) Cx2000: 3-Phase 230V 0.2 to 11kW (ND)	1-Phase 230V 0.75 to 3.7kW (ND) Sx2000: 3-Phase 230V 0.75 to 18.5kW (ND)
3-Phase 415V 0.75 to 11kW (ND) Fx2000: 3-Phase 415V 0.75 to 375kW (HD)	3-Phase 415V 0.75 to 90kW (ND), 0.4 to 22kW (HD) - IP66 Ex2000: 3-Phase 415V 5.5 to 450kW (ND)
Lx2000: 3-Phase 415V 3.7 to 22kW (HD)	Hx2000: 3-Phase 415V 0.75 to 90kW (ND)

Model type & Selection:



*For Cx2000 230Vac Single-Phase and Sx2000 IP66 drive mentioned current is for HD rating.
**Valid for Cx2000 series only.

Applications

x2000 Series Applications	Cx2000	Sx2000	Ex2000	Fx2000	Hx2000	Lx2000
Blowers	●	●	●	●		
ID / FD Fan	●	●	●	●		
Pump	●	●	●	●		
Conveyors	●	●		●		
Compressors		●	●	●		
Crane Hoisting		●		●		
Crane Traverse	●	●		●		
HVAC					●	
Damper Control	●	●	●	●		
Agitator		●		●		
Lifts Door Control	●					
Lifts & Escalators		●		●		●
AHU	●	●			●	
Winders		●		●		
Wire Drawing		●		●		
Ball Mill		●		●		
Textile Machinery	●	●		●		
Centrifuge		●		●		
Extruder		●		●		
Spinning Machine		●		●		
Rotary Klins				●		
Printing	●	●		●		
Crushers		●		●		
Hydraulic Press		●		●		
Plastic Machinery	●	●		●		
Food Packaging	●	●		●		
Solar Pump		●				
Mixers		●		●		
Tank Rotator		●		●		
Pulper		●		●		
Tea Making	●	●		●		
Rubber Machinery		●		●		
Machine Tools	●	●		●		
Material Handling	●	●		●		

Note: Above chart is only a general guideline. Please contact us with exact details of your application.

Cx2000



Compact, lightweight, easy to install, operate and service the Cx2000 is perfectly suited for conveyors, pumps, fans and textile machinery. It is engineered to keep your machine operating at optimum efficiency, even in the hot, humid and dusty conditions that characterise India's industrial environment. Ideal for replacement of conventional motor starters, where Cx2000 will provide better motor protection features with communication compatibility.



› Main Features

- Range: 0.1kW to 11kW
- V/F, sensorless vector control, slip compensation
- Integrated potentiometer
- Built-in PID
- Built-in braking chopper
- Torque boost for forward and reverse direction
- Draw mode
- Hardware base block
- Built-in 24V power source
- RPM display on keypad
- KEB for safety stop
- Auto tuning of motor
- Conformal Coating complying to IEC 60721-3-3 class 3C2
- Built-in RS485 Modbus RTU Communication

› Applications

- OEM Machines
- Plastic & Textile Machines
- Food & Packaging Machines
- Conveyors
- AHU Control
- Fan
- Pump
- Crane Control LT / CT



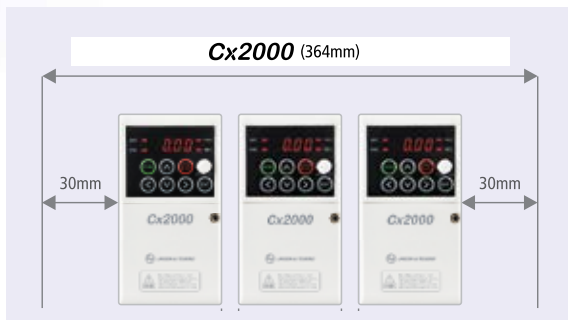
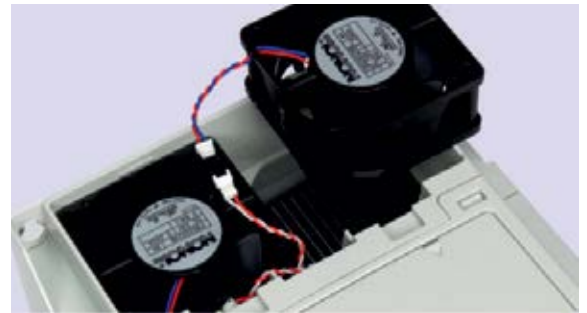
› User Convenience through Simple Operation

Integrated Potentiometer

- Possible to add reference from keypad and external signal
- Provides external potentiometer for easier frequency control
- Additional 0~5V analog input for frequency control
- Useful in DRAW Mode

› Easy Fan Maintenance

You can easily replace a fan without opening the drive cover.

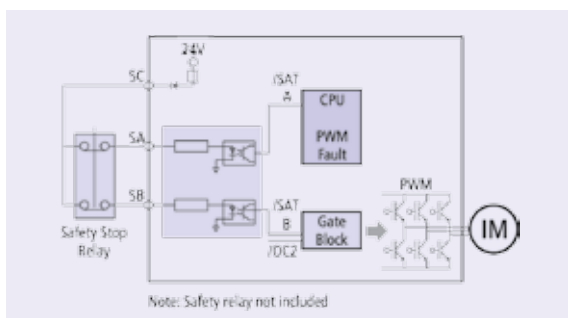
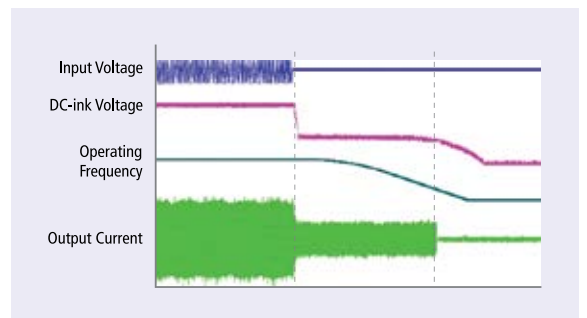


› Side-by-Side Installation

The panel size can be significantly reduced thanks to the Cx2000's side-by-side installation.

› KEB for Safe Operating Stop in the Event of Power Failure

By using the regenerated power from the decelerating load, the KEB function automatically protects the machine by providing safe (controlled) braking in case of a power outage.



› Compliance with Safety Requirements

- If a machine needs safe standstill functionality in case of emergency, the connection of SA, SB, and SC terminals that is shorted normally will be opened to block the drive output.
- Easy to comply with safety requirements at the system level by adding safe input functions complying with EN ISO 13849-1 Pld and EN61508SIL2 [EN60204-1, stop category 0]



External Keypad:

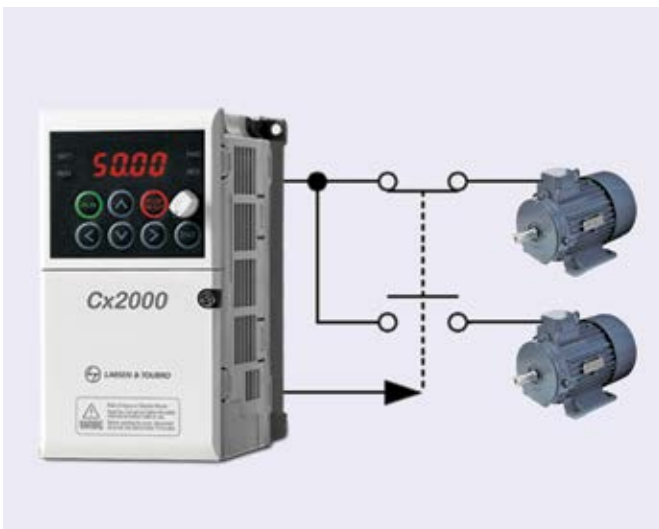
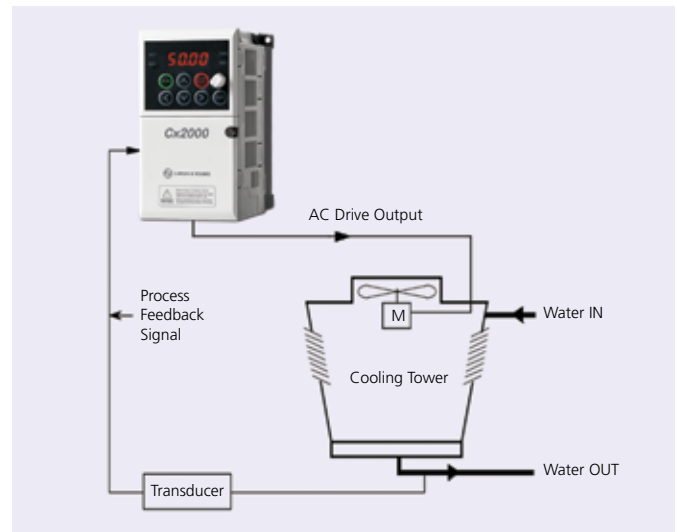
Cx2000 has model without built-in keypad for which external LED keypad (LTOP-DOP-50) is used which comes with default 3m cable.

Note:

- 1) For selection of Cx2000 model without keypad please refer page no. 5 "Model type and Selection"
- 2) For 7.5kW (ND) & 11kW (ND) ratings, there is a facility to connect the external keypad directly to the standard drive.

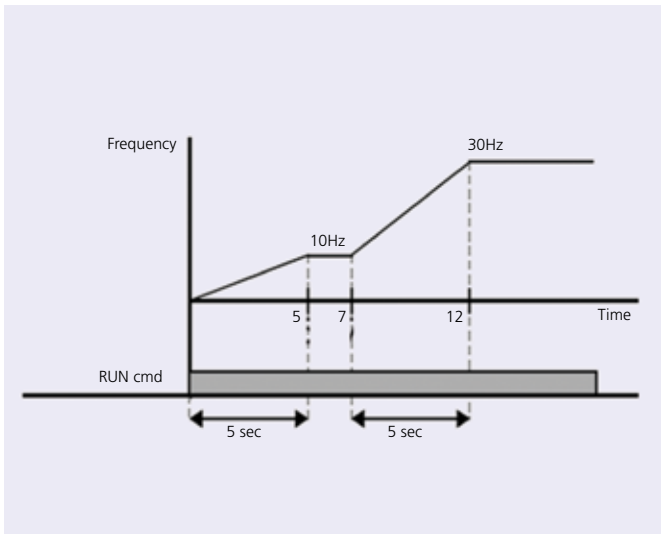
Built-in PID

- Useful in Pump, AHU applications to maintain process variables (Flow, Pressure & Temperature) as per required set-point.
- Available with sleep & wake-up functions
- No need for external PID Controller



2nd Motor Operation

- Useful when drive operates 2 motors connected to two different types of loads
- Single AC Drive can maintain 2 motor parameters with different Accel / Deccl parameter setting. It doesnot drive 2 motors at the same time.
- For isolated operation of motors one VFD can be used in place of 2

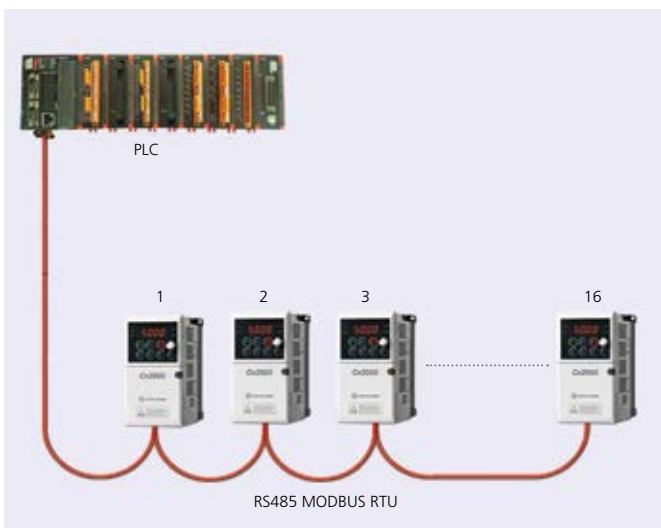
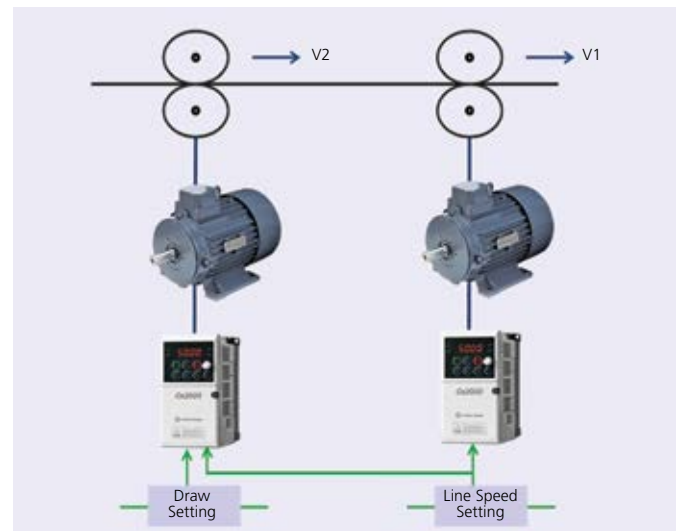


› Delta Frequency: Acceleration & Deceleration control

- Useful in standalone as well as process applications
- Acc-Dec time based on Delta frequency is normally used in process lines where gear ratio between one station to another station is different.
- In applications where there are multiple drives running at different frequencies and application demands all the drives reach the prescribed frequency at the same time, delta frequency is used.
- Settable from 0.00 sec to 6000 sec

› Draw Mode

- It is a kind of open loop tension control that uses the speed difference of motor running under main frequency command to keep material's tension steady in between
- Very useful for precise control of tension, linear velocity, etc.
- Settable manually through keypad potentiometer or analog inputs
- Applications like: wire drawing, pipe plants, etc.



› Built-in RS485 Modbus RTU

- Easy Integration with 3rd party devices
- No extra cost of communication card
- Maximum number of slaves: 16
- Grouped parameters to read & write with a single command

Input and Output Specifications: Input Voltage Single-Phase 230V (0.1 to 2.2kW - HD)

LTVF-C1 □□□□ BAA		0001	0002	0003	0005	0008	0011
Applicable Motor ¹⁾	HP	0.12	0.25	0.5	1	2	3
	kW (HD)	0.1	0.2	0.4	0.75	1.5	2.2
Output Ratings	Rated Capacity [kVA] (HD)	0.3	0.5	1.0	1.9	3.0	4.2
	Rated Current [A] ²⁾ (HD)	0.8	1.4	2.5	5.0	8.0	11
	Max. Output Frequency	400 [Hz] ³⁾					
	Max. Output Voltage [V]	Three-Phase 200 ~ 240V ⁴⁾					
Input Ratings	Rated Voltage [V]	Single-Phase 200 ~ 240 VAC (-15% ~ +10%)					
	Rated Current ²⁾ [A]	1.4	2.8	5.5	11	14.1	24
	Rated Frequency	50 ~ 60 [Hz] (±5%)					
Cooling Type	Natural Cooling			Forced Cooling			

Input and Output Specifications: Input Voltage Three-Phase 230V (0.2 to 11kW - ND)

LTVF-C2 □□□□ BAA			0001	0002	0003	0006	0010	0012	0018	0030	0040	
Applicable Motor ¹⁾	HD	[HP]	0.12	0.25	0.5	1	2	3	5	7.5	10	
		[kW]	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	
	ND	[HP]	0.25	0.5	1	1.5	3	4	5.4	10	15	
		[kW]	0.2	0.4	0.75	1.1	2.2	3.0	4.0	7.5	11.0	
Output Ratings	Rated Capacity [kVA]	HD	0.3	0.5	1.1	1.9	3.0	4.2	6.1	9.1	12.2	
		ND	0.4	0.7	1.3	2.4	3.8	5.2	7.6	12.1	16.3	
	Rated Current [A] ²⁾	HD	0.8	1.4	2.5	5.0	8.0	11.0	16.0	24.0	32.0	
		ND	1.1	1.8	3.1	6.3	10.0	12.0	18.0	30.0	40.0	
	Max. Output Frequency	400 [Hz] ³⁾										
	Max. Output Voltage [V]	Three-Phase 200 ~ 240V ⁴⁾										
Input Ratings	Rated Voltage [V]	Three-Phase 200 ~ 240 VAC (-15% ~ +10%)										
	Rated Current [A] ²⁾	HD	0.7	1.5	2.0	5.8	7.5	11.0	8.9	22.1	28.6	
		ND	1.1	1.9	3.9	7.3	10.8	13.9	24	28.6	41.2	
	Rated Frequency	50 ~ 60 [Hz] (±5%)										
Cooling Type	Natural Cooling					Forced Cooling						

Input and Output Specifications: Input Voltage Three-Phase 415V (0.75 to 11kW - ND)

LTVF-C4 □□□□ BAA			0002	0003	0005	0007	0010	0016	0023	
Applicable Motor ¹⁾	HD	[HP]	0.5	1.0	2.0	3.0	5.0	7.5	10.0	
		[kW]	0.4	0.75	1.5	2.2	3.7	5.5	7.5	
	ND	[HP]	1	1.5	3	4	5.4	10	15	
		[kW]	0.75	1.1	2.2	3.0	4.0	7.5	11.0	
Output Ratings	Rated Capacity [kVA]	HD	1.0	1.9	3.0	4.2	6.1	9.1	12.2	
		ND	1.2	2.4	3.8	5.2	7.6	12.1	16.3	
	Rated Current [A] ²⁾	HD	1.25	2.5	4.0	5.5	8.0	12.0	16.0	
		ND	2.0	3.1	5.1	6.9	10.0	16.0	23.0	
	Max. Output Frequency	400 [Hz] ³⁾								
	Max. Output Voltage [V]	Three-Phase 380 ~ 480V ⁴⁾								
Input Ratings	Rated Voltage [V]	Three-Phase 380 ~ 480 VAC (-15% ~ +10%)								
	Rated Current [A] ²⁾	HD	1.8	3.2	4.4	6	10.4	11.0	14.4	
		ND	2.1	4.3	5.9	8.1	14	14.7	21.9	
	Rated Frequency	50 ~ 60 [Hz] (±5%)								
Cooling Type	Natural Cooling				Forced Cooling					

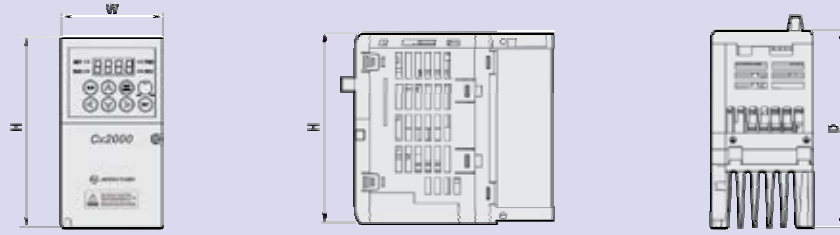
Note 1) - Indicates the maximum applicable motor capacity when using a 4-pole standard motor.

Note 2) - When carrier frequency setting (H39) is 6kHz or less.

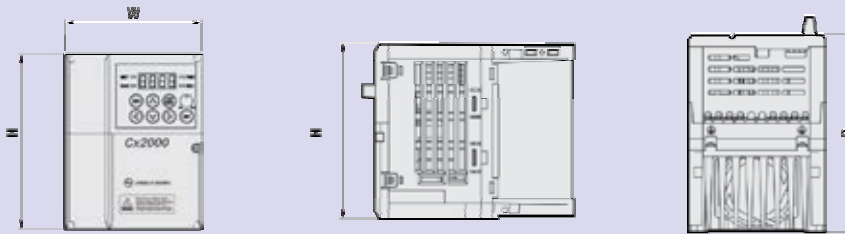
Note 3) - The max. frequency setting range can be 120Hz when H40 is set to 3 (Sensorless vector control).

Note 4) - The maximum output voltage cannot be higher than the input voltage and it can be programmable below input voltage.

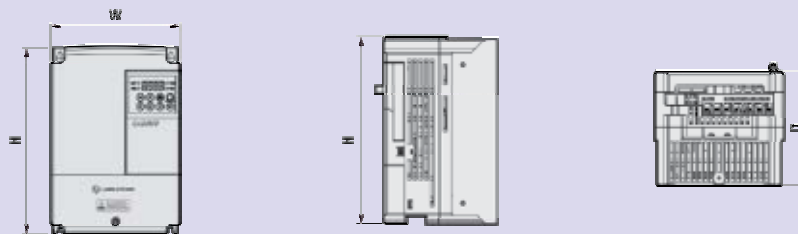
	Range	Single-Phase 230V	Three-Phase 230V	Three-Phase 415V
		0.1 to 2.2 kW (HD)	0.2 to 11 kW (ND)	0.75 to 11 kW (ND)
Standard Specifications	Enclosure Type	IP20		
	Overload Capacity	HD: 150% for 1min; ND: 110% for 1min		
	Max Output Voltage	Proportional to Input Voltage		
	Max Output Frequency	0 to 400Hz (Sensorless: 0 to 120Hz)		
	Rated Voltage	200 to 240V 1/3-phase (-15%/+10%) 380 to 480V 3-phase (-15%/+10%)		
	Rated Frequency	50/60Hz (-5/+5%)		
	Keypad	Built-in, Without keypad option available		
	Braking Chopper	Built-in for entire range		
Control Details	Control Method	V/F, Sensorless Vector Control, Slip Compensation		
	Starting Torque	150% at 3 Hz in V/F		
	Frequency Control Range	0.01 to 400Hz for V/F, 0 to 120Hz for Sensorless Vector Control		
	Frequency Precision Setting	Digital command: 0.01Hz Analog command: 0.03Hz (Max. frequency: 60Hz)		
	Frequency Setting	Analog type: 0 ~ 10[V], 0 ~ 20[mA] Digital type: Keypad, Panel potentiometer		
	Output Frequency Resolution	0.01Hz		
	V/F pattern	Linear, squared, user V/F		
	Accel/Decel Time	0.0 to 6000 Sec		
	Braking Torque	Continuous Regeneration Torque 20% (150% with DBR)		
	Features	Built PID, RPM display, 2nd motor operation, easy maintenance of fan, built-in safety circuit, draw mode, inbuilt 24V power source, brake control, auto tuning, KEB		
Protection	Faults	Over voltage, low voltage, over current, short circuit, ground current detection, inverter overheat, motor overheat, input and output phase loss, overload protection, loss of frequency command, hardware fault, cool fan trip, brake error.		
	Alarm	Stall prevention, overload		
	Momentary Power Loss Ride Through	Below 16 msec: Continuous operation Above 16 msec: Auto restarting		
Interface	DI	5 (Programmable NPN/PNP)		
	DO	1 (Programmable NO/NC)		
	AI	1 (4-20mA / 0 to 10Vdc)		
	AO	1 (0 to 10Vdc)		
	Safety I/P	2, complying with EN ISO 13849-1 Pld and EN61508SIL2 [EN60204-1, stop category 0]		
	Communication	RS485 Modbus RTU		
	Potentiometer	Integrated		
Environment	Area of Use	Indoors. There shall not be corrosive air, combustible gas, oil mist, dust		
	Ambient Temperature	-10°C to 50°C for HD, -10°C to 40°C for ND		
	Storage Temperature	-20°C to 65°C		
	PCB Protection	Conformal Coating complying to IEC 60721-3-3 class 3C2		
	Application Humidity	Below relative humidity 90% RH (no condensation)		
	Altitude	Below 1000m		
	Vibration	5.9m/sec ² (0.6G)		
Global Compliance	CE, UL, RoHS			



Input Voltage	Drive Model	W (mm)	H (mm)	D (mm)	Weight (kg)
Single-Phase 230 V	LTVF-C10001BAA	68	128	93	0.55
	LTVF-C10002BAA	68	128	93	0.55
	LTVF-C10003BAA	68	128	128	0.8
Three-Phase 230 V	LTVF-C20002BAA	68	128	93	0.55
	LTVF-C20001BAA	68	128	93	0.55
	LTVF-C20003BAA	68	128	128	0.8
	LTVF-C20006BAA	68	128	128	0.8
Three-Phase 415 V	LTVF-C40002BAA	68	128	128	0.8
	LTVF-C40003BAA	68	128	128	0.8



Input Voltage	Drive Model	W (mm)	H (mm)	D (mm)	Weight (kg)
Single-Phase 230 V	LTVF-C10005BAA	100	128	130	1.22
	LTVF-C10008BAA	100	128	130	1.22
	LTVF-C10011BAA	140	128	145	1.97
Three-Phase 230 V	LTVF-C20010BAA	100	128	130	1.22
	LTVF-C20012BAA	100	128	145	1.42
	LTVF-C20018BAA	140	128	145	1.97
Three-Phase 415 V	LTVF-C40005BAA	100	128	130	1.22
	LTVF-C40007BAA	100	128	145	1.42
	LTVF-C40010BAA	140	128	145	1.97



Input Voltage	Drive Model	W (mm)	H (mm)	D (mm)	Weight (kg)
Three-Phase 230 V	LTVF-C20030BAA	160	232	141	3.3
	LTVF-C20040BAA	160	232	141	3.3
Three-Phase 415 V	LTVF-C40016BAA	160	232	141	3.3
	LTVF-C40023BAA	160	232	141	3.3

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

Sx2000



The Sx2000 adds a new dimension to L&T's AC drive solutions. Built to L&T's stringent quality standards, the Sx2000 is tested and certified to meet global benchmarks, giving you the assurance of total reliability. The Sx2000 is built to deliver powerful performance. It produces a starting torque of 200% at 0.5 Hz, which provides better control at low-speed. Its compact size enables panel-size reduction, hence helps in space-efficient design.

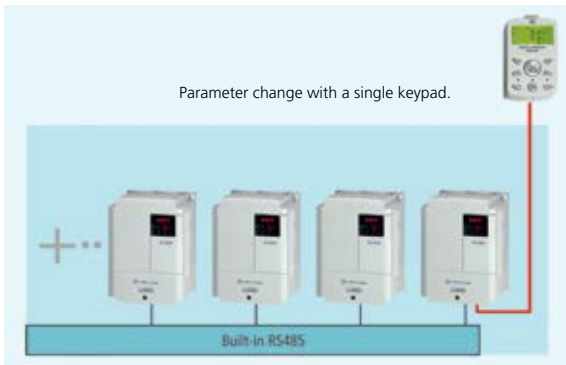


› Main Features

- Range: 0.75kW to 90kW
- V/F, Sensorless Vector Control, Slip Compensation
- Starting Torque at 200% at 0.5Hz for Sensorless Control
- Component Life Monitor
- Peer to Peer Communication to share I/Os
- Built-in PLC Logic
- Built-in Brake Control
- Multi Keypad
- Stores last 5 faults
- Conformal Coating complying to IEC 60721-3-3 class 3C2
- Built-in RS485 Modbus RTU Communication

› Applications

- OEM Machines
- Elevators
- Plastic & Textile Machines
- Conveyors
- Compressors
- Wire Drawing
- Extruders
- AHU Control
- Fan & Pump
- Crane Hoist
- Crane Control LT / CT
- Solar Pump



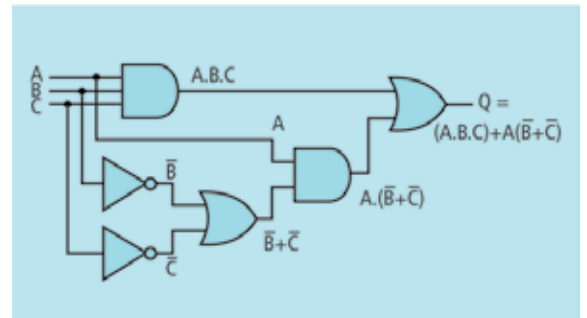
Multi-keypad function

Single LCD keypad can be used to set up the parameters of RS485 connected drives.

- LCD (LTOP-DOP-200) keypad (same as Fx2000 model) enables handy parameter set-up.
- Multi-language support available

User sequence function (PLC Logic)

- Simple PLC sequences can be operated with various function block combinations with direct access to Drive parameters.
- Function blocks: AND, NOR, ADD, SUB, XOR, MIN, MAX, COMPARE, TIMER, SWITCH, UP/DWN COUNT..etc
- No Software required to create logic

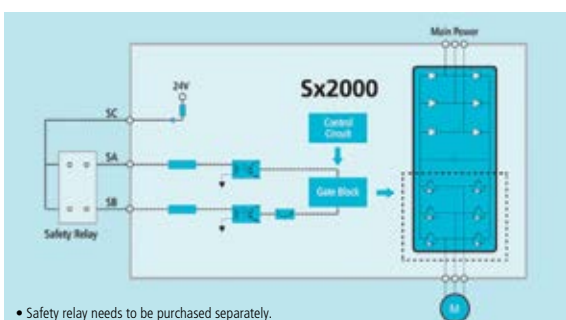


Peer-to-Peer function embedded

I/O can be shared among master and slave drives. (RS485 wiring required).

Built-in Brake Control

- Brake opening command by drive under the following conditions:
 - Inverter Output Frequency > Brake Release Frequency
 - Inverter Output Current > Brake Release Current
- Brake release with delay
- Ensures Slip prevention
- Brake Close frequency different settings possible for Hoisting & Lowering Motion

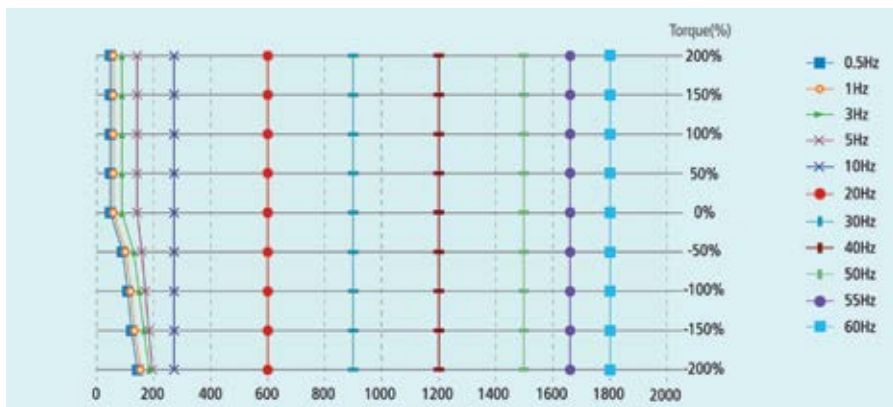


• Safety relay needs to be purchased separately.

Safety Function

Sx2000 has in-built safety functions conforming to modern safety standards.

The safety input function meets EN ISO 13849-1 PLd and EN 61508 SIL2 (EN60204-1, stop category 0). This feature is standard and enables compliance with current safety standards.

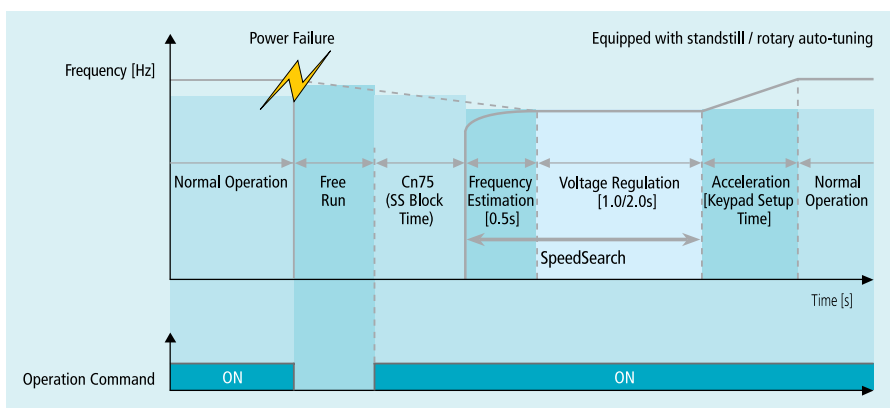


► **Powerful sensorless control**

Starting torque of 200%/0.5Hz is produced and provides robust power in the low speed region. The motor auto-tuning function is optimised to maximise motor performance.

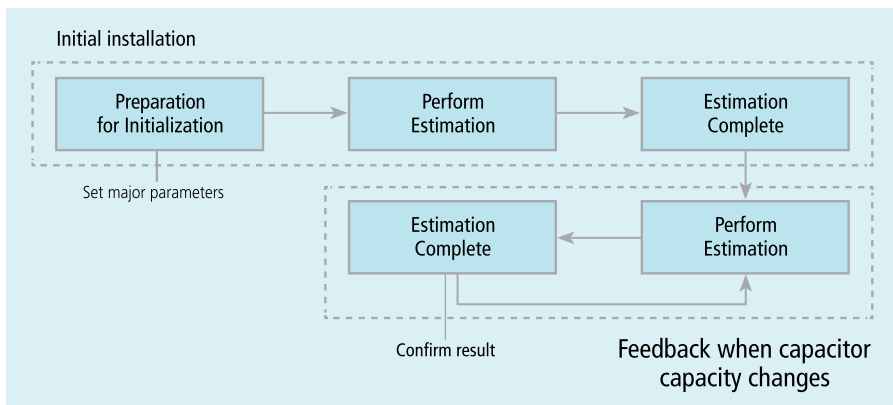
► **Flying-start function**

Drive capable of reliable and smooth re-starts even for bi-directional rotating loads.



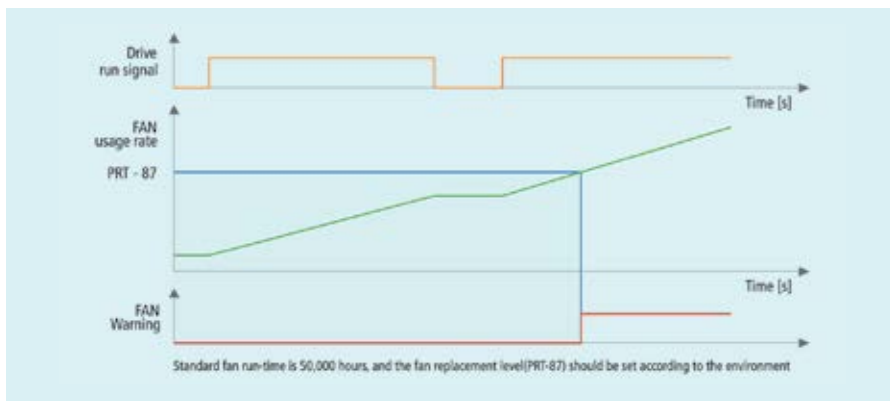
► **Main capacitor lifecycle estimation**

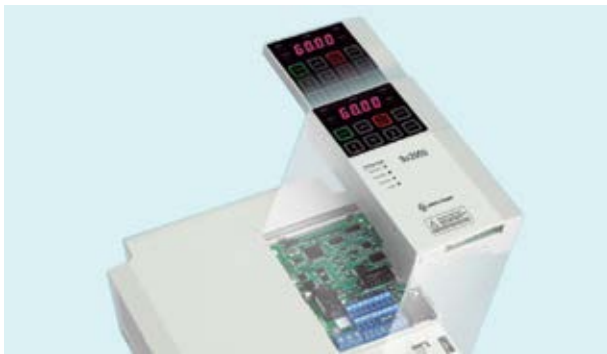
Estimated through monitoring the change in the capacitance value.



► **Fan lifecycle estimation**

Warning signal is displayed when fan is operated over a certain amount of hours.





Optional Accessories - easy to install & use

- *Optional fieldbus networks:
- ① **Profibus-DP** (LTCI-PDP-S.)
 - ② **Modbus TCP / Ethernet IP** (LTCI-ETH-S.)
 - ③ **CANopen** (LTCI-CAN-S.)

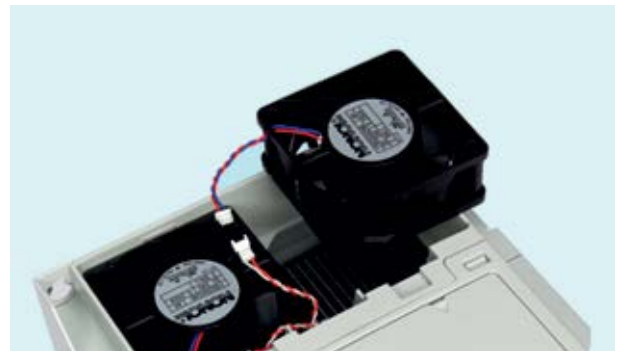
***I/O Expansion Card** (LTIO-EXP-S.):

- Digital input - 3 (PNP / NPN)
- Digital output - 2 (R) AC 250V - 1A / DC 30V - 1A
- Analog input - 2, 1 Voltage (-10 to +10V)
1 Current (0 to 20mA) / 1 Voltage (0 to +10V)
- Analog output - 1, 1 Voltage (0 to +10V) / 1 Current (0 to 20mA)

*Only one option card can be used at a time.

Simple cooling fan replacement

Tool-less replacement of cooling fan without dismantling the drive



Flange type

To reduce heat losses inside the panel
 The heat sink can be mounted outside of the panel in case the space is limited.

Built-in DC reactor

Effective in improving power factor and decreasing THD.
 • 3-phase 400V 37~90kW (ND)

Dual rating operation

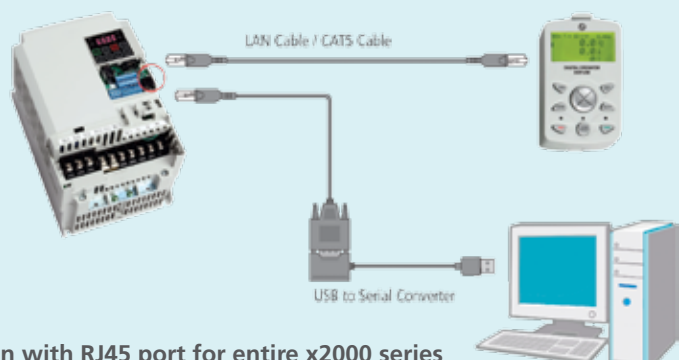
Designed to be used for heavy and normal duty applications.

Overload capacity:

- Heavy duty operation **150%** of rated current, 60 seconds
- Normal duty operation **120%** of rated current, 60 seconds

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



DriveConnect software connection with RJ45 port for entire x2000 series

➤ Input and output specification: **Input Voltage Single-Phase 230V (0.75 to 3.7kW - ND)**

LTVF-S1 □□□□ BAA			0003	0006	0010	0012	
Applicable Motor	Heavy Duty [HD]	HP	0.5	1.0	2.0	3.0	
		kW	0.4	0.75	1.5	2.2	
	Normal Duty [ND]	HP	1.0	2.0	3.0	5.0	
		kW	0.75	1.5	2.2	3.7	
Output Rating	Capacity [kVA]	Heavy Duty [HD]	1.0	1.9	3.0	4.2	
		Normal Duty [ND]	1.2	2.3	3.8	4.6	
	Rated Current [A]	Heavy Duty [HD]	2.5	5.0	8.0	11.0	
		Normal Duty [ND]	3.1	6.0	9.6	12.0	
	Frequency [Hz]	0~400Hz (IM Sensorless : 0~120[Hz])					
Voltage [V]	3-phase 200~240V						
Input Rating	Voltage [V]	1-phase 200~240VAC (-15% ~ +10%)					
	Frequency [Hz]	50~60Hz (±5%)					
	Rated Current [A]	Heavy Duty [HD]	4.8	9.3	15.6	21.7	
		Normal Duty [ND]	5.8	11.7	19.7	24.0	
Display		LED [LCD optional]					
Braking Unit		Built-in					

➤ Input and output specification: **Input Voltage Three-Phase 230V (0.75 to 18.5kW - ND)**

LTVF-S2 □□□□ BAA			0003	0006	0010	0012	0018	0030	0040	0056	0069	
Applicable Motor	Heavy Duty [HD]	HP	0.5	1.0	2.0	3.0	5.4	7.5	10.0	15.0	20.0	
		kW	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11.0	15.0	
	Normal Duty [ND]	HP	1.0	2.0	3.0	5.0	7.5	10.0	15.0	20.0	25.0	
		kW	0.75	1.5	2.2	3.7	5.5	7.5	11.0	15.0	18.5	
Output Rating	Capacity [kVA]	Heavy Duty [HD]	1.0	1.9	3.0	4.2	6.5	9.1	12.2	17.5	22.9	
		Normal Duty [ND]	1.2	2.3	3.8	4.6	6.9	11.4	15.2	21.3	26.3	
	Rated Current [A]	Heavy Duty [HD]	2.5	5.0	8.0	11.0	17.0	24.0	32.0	46.0	60.0	
		Normal Duty [ND]	3.1	6.0	9.6	12.0	18.0	30.0	40.0	56.0	69.0	
	Frequency [Hz]	0~400Hz (IM Sensorless : 0~120[Hz])										
Voltage [V]	3-phase 200~240V											
Input Rating	Voltage [V]	3-phase 200~240VAC (-15% ~ +10%)										
	Frequency [Hz]	50~60Hz (±5%)										
	Rated Current [A]	Heavy Duty [HD]	2.2	4.9	8.4	11.8	18.5	25.8	34.9	50.8	66.7	
		Normal Duty [ND]	3.0	6.3	10.8	13.1	19.4	32.7	44.2	62.3	77.2	
Display		LED [LCD optional]										
Braking Unit		Built-in										

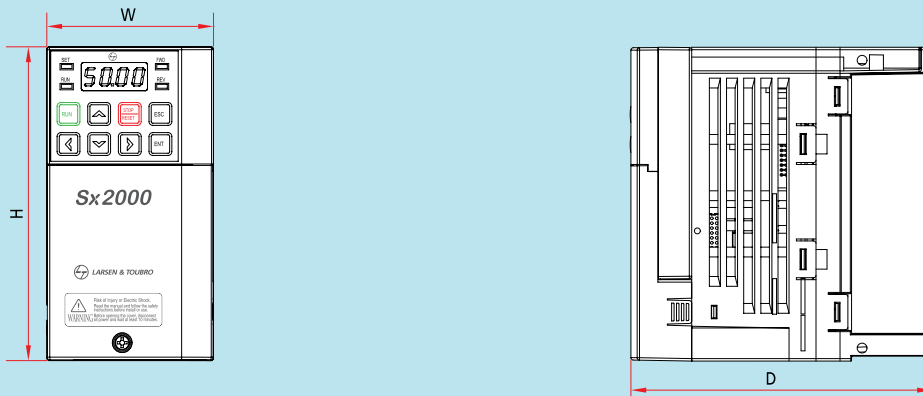
➤ Input and output specification: **Input Voltage Three-Phase 415V (0.75 to 30kW - ND)**

LTVF-S4 □□□□ BAA			0002	0003	0005	0007	0010	0016	0023	0030	0038	0044	0058
Applicable Motor	Heavy Duty [HD]	HP	0.5	1.0	2.0	3.0	5.4	7.5	10.0	15.0	20.0	25.0	30.0
		kW	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11.0	15.0	18.5	22.0
	Normal Duty [ND]	HP	1.0	2.0	3.0	5.0	7.5	10.0	15.0	20.0	25.0	30.0	40.0
		kW	0.75	1.5	2.2	3.7	5.5	7.5	11.0	15.0	18.5	22.0	30.0
Output Rating	Capacity [kVA]	Heavy Duty [HD]	1.0	1.9	3.0	4.2	6.5	9.1	12.2	18.3	22.9	29.7	34.3
		Normal Duty [ND]	1.5	2.4	3.9	5.3	7.6	12.2	17.5	22.9	29.0	33.5	44.2
	Rated Current [A]	Heavy Duty [HD]	1.3	2.5	4.0	5.5	9.0	12.0	16.0	24.0	30.0	39.0	45.0
		Normal Duty [ND]	2.0	3.1	5.1	6.9	10.0	16.0	23.0	30.0	38.0	44.0	58.0
	Frequency [Hz]	0~400Hz (IM Sensorless : 0~120[Hz])											
Voltage [V]	3-phase 380~480V												
Input Rating	Voltage [V]	3-phase 380~480VAC (-15% ~ +10%)											
	Frequency [Hz]	50~60Hz (±5%)											
	Rated Current [A]	Heavy Duty [HD]	1.1	2.4	4.2	5.9	9.8	12.9	17.5	26.5	33.4	43.6	50.7
Normal Duty [ND]		2.0	3.3	5.5	7.5	10.8	17.5	25.4	33.4	42.5	49.5	65.7	
DC Reactor		External [option]											
Display		LED [LCD optional]											
Braking Unit		Built-in											

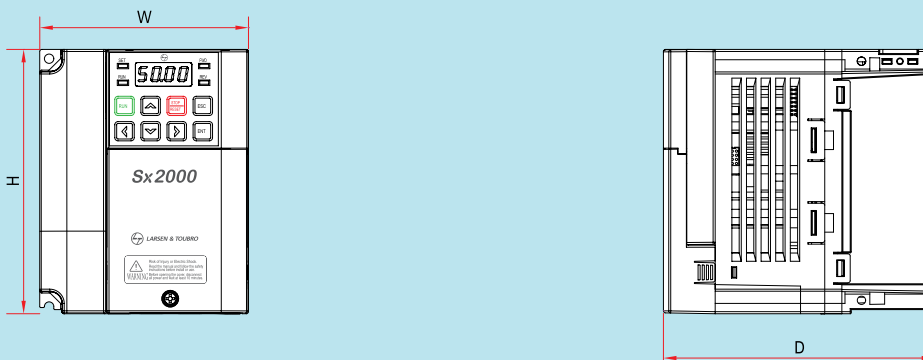
➤ Input and output specification: **Input Voltage Three-Phase 415V (37 to 90kW - ND)**

LTVF-S4 □□□□ BAA			0075	0091	0107	0142	0169
Applicable Motor	Heavy Duty [HD]	HP	40.0	50.0	60.0	75.0	100.0
		kW	30.0	37.0	45.0	55.0	75.0
	Normal Duty [ND]	HP	50.0	60.0	75.0	100.0	120.0
		kW	37.0	45.0	55.0	75.0	90.0
Output Rating	Capacity [kVA]	Heavy Duty [HD]	46.5	57.2	69.4	83.8	115.8
		Normal Duty [ND]	57.2	69.4	81.5	108.2	128.8
	Rated Current [A]	Heavy Duty [HD]	61.0	75.0	91.0	110.0	152.0
		Normal Duty [ND]	75.0	91.0	107.0	142.0	169.0
	Frequency [Hz]	0~400Hz (IM Sensorless : 0~120[Hz])					
Voltage [V]	3-phase 380~480V						
Input Rating	Voltage [V]	3-phase 380~480VAC (-15% ~ +10%)					
	Frequency [Hz]	50~60Hz (±5%)					
	Rated Current [A]	Heavy Duty [HD]	56.0	69.0	85.0	103.0	143.0
Normal Duty [ND]		69.0	85.0	100.0	134.0	160.0	
DC Reactor		Built-in					
Display		LCD					
Braking Unit		External [option]					

	Range	Single-Phase 230V	Three-Phase 230V	Three-Phase 415V
		0.75 to 3.7kW (ND)	0.75 to 18.5kW (ND)	0.75 to 90kW (ND)
Standard Specifications	Enclosure Type	IP20		
	Overload Capacity	HD: 150% for 1min; ND: 120% for 1min		
	Max Output Voltage	Proportional to Input Voltage		
	Max Output Frequency	0 to 400Hz (Sensorless: 0 to 120Hz)		
	Rated Voltage	380 to 480V Three-phase (-15%/+10%)		
	Rated Frequency	50/60Hz (-5/+5%)		
	Keypad	Built-in LED till 30kW (ND) & Above 30kW standard Detachable LCD		
	Braking Chopper	Built-in up to 30kW (ND)		
	DC Reactor	Built-in from 37kW to 90kW		
	Control Details	Control Method	V/F, Sensorless Vector Control, Slip Compensation	
Starting Torque		200% at 0.5Hz for Sensorless Control & 150% at 3Hz for V/F		
Frequency Control Range		0.01 to 400Hz for V/F, 0 to 120Hz for Sensorless Vector Control		
Frequency Precision Setting		Digital command: 0.01Hz Analog command: 0.03Hz (Max. frequency: 60Hz)		
Frequency Setting		Analog type: - 10 to 10V, +0 to 10[V], 4 to 20[mA], Digital type: Keypad, panel potentiometer, pulse train input		
Output Frequency Resolution		0.01Hz		
V/F pattern		Linear, squared, user V/F		
Accel/Decel Time		0.0 to 6000 Sec		
Braking Torque		Continuous Regeneration Torque 20% (150% with DBR)		
Features		Multi keypad, peer-to-peer communication to share I/Os, user sequence, inbuilt PID, component life monitor, no motor detection, auto tuning, KEB, DI/DO ON-OFF delay, torque control, torque boost, DC braking, fire mode, flux braking, 2 nd motor, frequency jump, slip compensation		
Protection	Faults	Under load trip, low voltage trip, phase loss trip, no motor trip, exterior brake trip, safety input error, IO board trip inverter overload warning, lost command warning, overheat Trip, encoder trip, DBR %ED warning		
	Alarm	Command Loss trip, overload, inverter overload, fan operation, resistance braking, nos of corrections on rotor auto tuning		
	Momentary Power Loss Ride Through	Continuous Operation: Heavy Loads less then 15msec, normal load less then 8msec, Auto Restart Operation: Heavy Loads more then 15msec, normal load more then 8msec		
Interface	DI	7 (Programmable NPN/PNP)		
	DO	1 (Programmable NO/NC) + 1 TR till 30kW, 2 (Programmable NO/NC) + 1 TR above 30kW		
	AI	2 (4-20mA / - 10 to + 10Vdc)		
	AO	1 (4-20mA / 0 to 10Vdc) till 30kW, 1 (4-20mA) + 1 (0 to 10Vdc) above 30kW		
	Pulse Train	1 I/P & 1 O/P (0 to 32Khz)		
	Communication	Built-in RS485 Modbus RTU		
	Safety I/P	2, complying with EN ISO 13849-1 Pld and EN61508SIL2 [EN60204-1, stop category 0]		
Environment	Area of Use	Indoors. There shall not be corrosive air, combustible gas, oil mist, dust and other pollutants		
	Ambient Temperature	-10°C to 50°C for HD, -10°C to 40°C for ND		
	Storage Temperature	-20°C to 65°C		
	PCB Protection	Conformal Coating complying to IEC 60721-3-3 class 3C2		
	Application Humidity	Below relative humidity 90% RH (no condensation)		
	Altitude	Below 1000m		
	Vibration	9.8m/sec ² (1G)		
Global Compliance	CE, UL, RoHS			

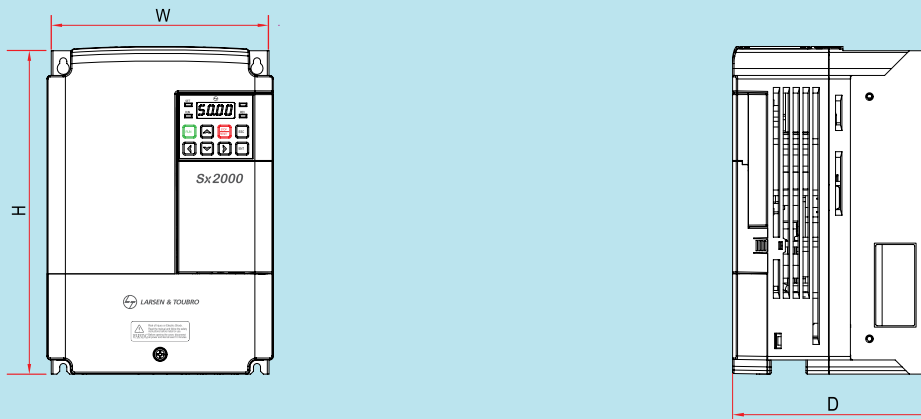


Input Voltage	Drive Cat. No.	W (mm)	H (mm)	D (mm)	Weight (kg)
Single-Phase 230 V	LTVF-S10003BAA	68	128	128	0.88
Three-Phase 230 V	LTVF-S20003BAA	68	128	123	0.86
	LTVF-S10006BAA	68	128	128	0.86
Three-Phase 415 V	LTVF-S40002BAA	68	128	123	0.86
	LTVF-S40003BAA	68	128	128	0.88



Input Voltage	Drive Cat. No.	W (mm)	H (mm)	D (mm)	Weight (kg)
Single-Phase 230 V	LTVF-S10006BAA	100	128	130	1.3
	LTVF-S10010BAA	100	128	145	1.5
	LTVF-S10012BAA	140	128	145	2.2
Three-Phase 230 V	LTVF-S20010BAA	100	128	130	1.5
	LTVF-S20012BAA	100	128	145	1.5
	LTVF-S20018BAA	140	128	145	2.3
Three-Phase 415 V	LTVF-S40005BAA	100	128	130	1.5
	LTVF-S40007BAA	100	128	145	1.5
	LTVF-S40010BAA	140	128	145	2.7

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



Input Voltage	Drive Cat. No.	W (mm)	H (mm)	D (mm)	Weight (kg)
Three-Phase 230 V	LTVF-S20030BAA	160	232	140	3.3
	LTVF-S20040BAA	160	232	140	3.3
	LTVF-S20056BAA	180	290	163	4.6
	LTVF-S20069BAA	220	350	187	4.6
Three-Phase 415 V	LTVF-S40016BAA	160	232	140	3.3
	LTVF-S40023BAA	160	232	140	3.4
	LTVF-S40030BAA	180	290	163	4.6
	LTVF-S40038BAA	180	290	163	4.8
	LTVF-S40044BAA	220	350	187	7.5
	LTVF-S40058BAA	220	350	187	7.5



Input Voltage	Drive Cat. No.	W (mm)	H (mm)	D (mm)	Weight (kg)
Three-Phase 415 V	LTVF-S40075BAA	275	450	284	26
	LTVF-S40091BAA	325	510	284	35
	LTVF-S40107BAA	325	510	284	35
	LTVF-S40142BAA	325	550	309	43
	LTVF-S40169BAA	325	550	309	43

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

Fx2000



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.

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.

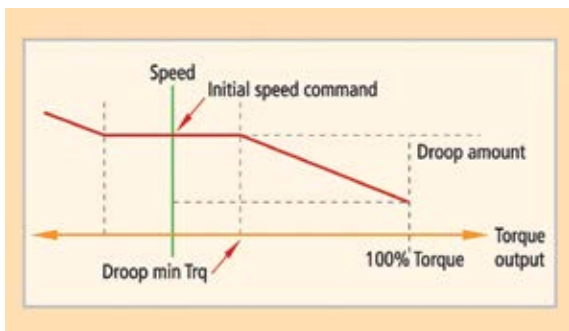


› Main Features

- Range: 0.75kW to 375kW (HD)
- V/F control, V/F with PG, Slip compensation, Sensorless Vector Control, Close Loop Vector Control
- Built-in Macro for Crane & Wobulation
- Winder Application
- Starting Torque: 250% at 0Hz for Closed Loop
- Optional Smart PLC
- Auto Sequence
- Droop Control
- Conformal Coating complying to IEC 60721-3-3 class 3C2
- Built-in RS485 Modbus RTU Communication

› Applications

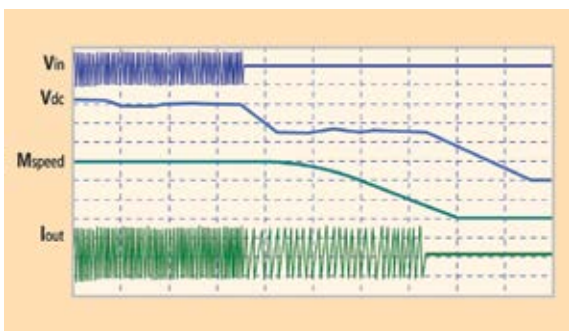
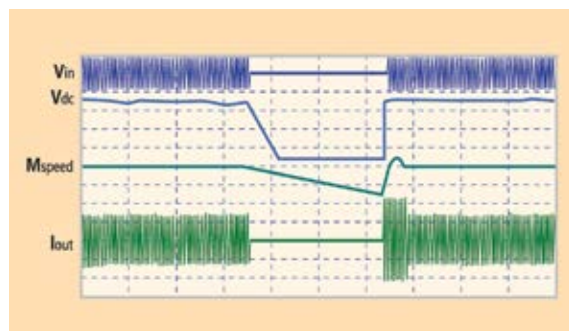
- Crane Hoist
- Crane Control LT / CT
- Winders
- Wire Drawing
- Plastic & Textile Machines
- Conveyors
- Compressors
- Extruders
- Fan
- Pump



➤ **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**

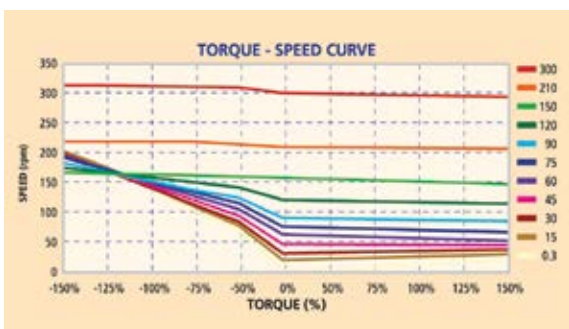
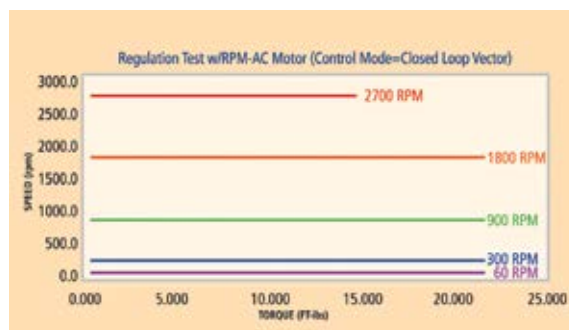


➤ **Kinetic Energy Buffering (KEB) for a stable system stop in case of power loss or failure**

➤ **Closed Loop Vector realizing precise speed/torque control**

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

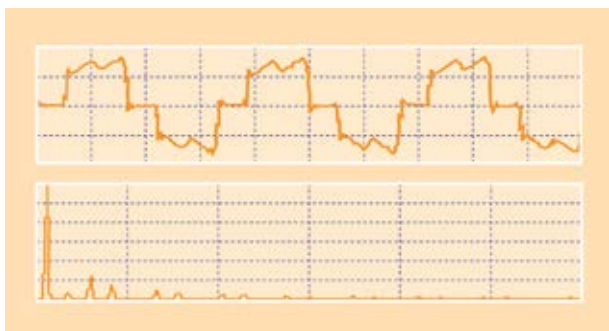
- Speed control range 1000:1
- Instant Max. torque control capability 250%
- 50Hz speed control response



➤ **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

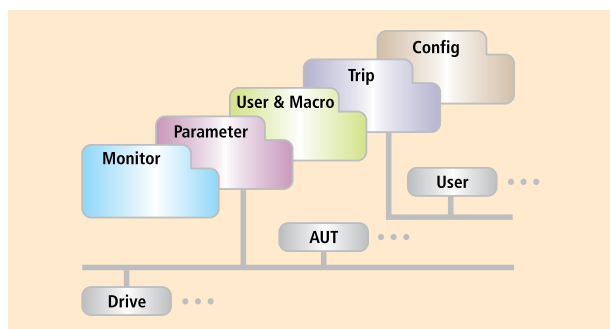
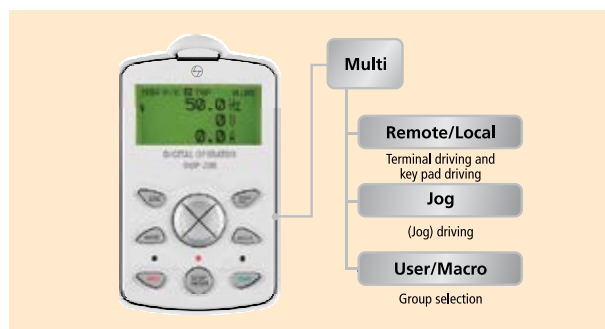


➤ **DC reactor built-in*** for harmonic reduction and power factor improvement

* From 22kW to 280kW (ND)

➤ **Multi-function key**

It can be programmed for different functions like Remote / Local, User / Macro Selection & JOG



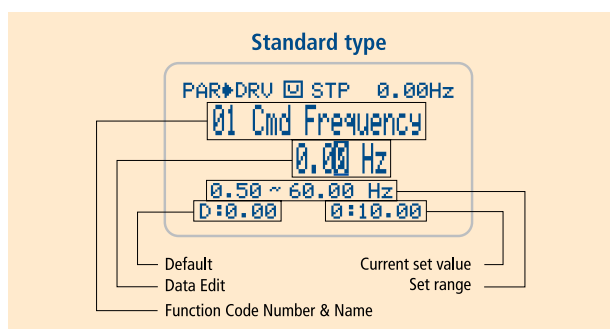
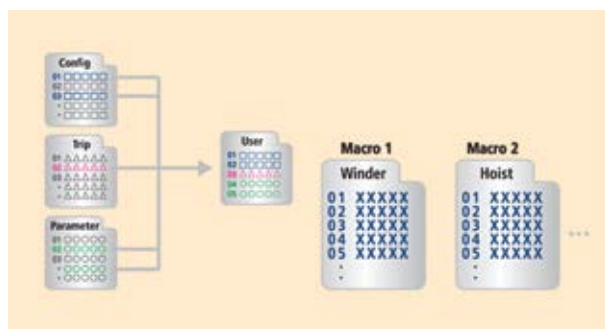
➤ **Efficient architecture of 5-mode 15-parameter groups**

Each mode has its own function items suitable for desired properties

eg. Monitor: Displays information on the operating status of the inverter

➤ **User & Macro group support**

- User can define parameters together they use often in User Macro
- Maximum 64 number of parameters can be saved
- Same parameter can be saved several times



➤ **Wide viewing-angle graphic LCD keypad**

- 3 LED
- 11 Keys
- 4 Lines for monitoring
- Built-in memory to store parameters on keypad



› Built-in Crane Algorithm

Enhance-Torque Control

- 250% starting torque in closed loop control
- Overload capacity of 200% for 3 seconds

Built-in Brake Control

- Brake opening command by drive under the following conditions:
 - Inverter Output Frequency > Brake Release Frequency
 - Inverter Output Current > Brake Release Current
- Brake release with delay
- Ensures Slip prevention
- Brake Close frequency different settings possible for Hoisting & Lowering Motion

› Winder Solution - WEB (Optional)

Fx2000 has optional Winder Software with high precision control for:

- Tension control with load cell / dancer
- Diameter calculation
- Thickness calculation
- Taper function
- Splicing function
- Quick stop
- Draw function



› Wobulation / Traverse Control

- Ideal for textile machines, where this function monitors disturbance pattern
- Built-in macro for textile application
- No external controller required

➤ Rated Input and Output: Input Voltage Three-Phase 415V (0.75 to 22kW - HD)

Type : LTVF-F4□□□□ □AA		0004	0006	0008	0012	0016	0024	0030	0039	0045	0061	
¹⁾ Applicable Motor (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 Capacity [A]	HD	2.5	4	6	8	12	16	24	30	39	45
		ND	4	6	8	12	16	24	30	39	45	61
	Rated Capacity [kVA]-HD		1.9	3	4.5	6.1	9.1	12.2	18.3	22.9	29.7	34.3
	Output Frequency		³⁾ 0 ~ 400 [Hz] (Sensorless-1: 0~300Hz, Sensorless-2, Vector: 0.1~120Hz)									
Output Voltage [V]		⁴⁾ 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	
DC Reactor		External [option]									Built-in	
Braking Unit		Built-in										

➤ Rated Input and Output: Input Voltage Three-Phase 415V (30 to 375kW - HD)

Type : LTVF-F4□□□□ □AA		0075	0091	0110	0152	0183	0223	0264	0325	0370	0432	0547	0613	0731	0877	
¹⁾ Applicable Motor (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	450	
Rated Output	Rated Capacity [kVA]-HD		46	57	69	84	116	139	170	201	248	286	329	416	467	557
	²⁾ Rated Capacity [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		³⁾ 0 ~ 400 [Hz] (Sensorless-1: 0~300Hz, Sensorless-2, Vector: 0.1~120Hz)													
Output Voltage [V]		⁴⁾ 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	
DC Reactor		Built-in										External [option]				
Braking Unit		External [option]														

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

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

3) 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).

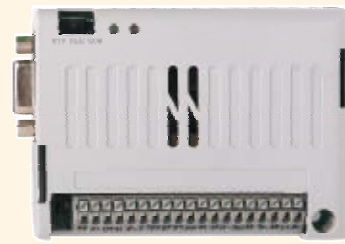
In case of Sensorless-2, you can set the frequency at up to 120Hz by selecting 3, 4 as the control mode (DRV-09 Control Mode).

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

	Range	Three-Phase 415V, 0.75 to 375kW (HD)
Standard Specifications	Enclosure Type	IP21 below 75kW (HD) & IP00 till 375kW (HD)
	Overload Capacity	HD: 150%/ 1min; ND: 110%/ 1min, 200% instantaneous for 3 seconds
	Max Output Voltage	Proportional to input voltage
	Max Output Frequency	0 to 400Hz (1000Hz optional) (Sensorless-1: 0 to 300Hz, Sensorless-2, Vector: 0.0~120Hz)
	Rated Voltage	380 to 480V Three-phase (-15%/+10%)
	Rated Frequency	50/60Hz (-5/+5%)
	Keypad	LCD Detachable
	DC Reactor	Built-in from 22kW to 280kW (ND)
	Braking Chopper	Built-in till 22kW (HD)
	Control Details	Control Method
Starting Torque		150% for 60 Sec, 200%/0.3Hz (Sensorless), 200%/ORPM (Vector)
Frequency Control Range		0 to 400Hz in V/F, 0 to 300Hz in Sensorless 1, 0 to 120Hz in Sensorless 2 / Vector
Frequency Precision Setting		Digital command operation : 0.01% of the maximum frequency Analog command operation : 0.1% of the maximum frequency
Frequency Setting		Analog: 0 ~ 10[V], -10 ~ 10[V], 0 ~ 20[mA] Digital: keypad
Output Frequency Resolution		0.01Hz
V/F pattern		Linear, double reduction, user V/F
Accel/Decel Time		0.0 to 6000 Sec
Braking Torque		Continuous Regeneration Torque 20% (150% with DBR)
Features		PID control, up-down operation, 3-wire operation, DC break, frequency limit, frequency jump, second function, slip compensation, reverse rotation prevention, auto restarting, auto tuning flying start, energy buffering, power breaking, flux breaking, leakage current reduction, MMC, easy start
Protection	Faults	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
	Alarm	Stall prevention, overload, light load, encoder error, fan failure, keypad command loss, speed command loss
	Momentary Power Loss Ride Through	Continuous Operation: Heavy Loads below 15 msec & normal loads below 8msec Auto Restarts: Heavy Loads above 15 msec & normal loads above 8msec
Interface	DI	8 (Programmable NPN/PNP)
	DO	2 (Programmable NO/NC) + 1 TR
	AI	1Nos, 4-20mA & 1Nos, 0 to 10Vdc
	AO	1Nos, 4-20mA & 1Nos, 0 to 10Vdc
	Communication	Built-in RS485 Modbus RTU
Environment	Area of Use	Indoors, There shall not be corrosive air, combustible gas, oil mist, dust and other pollutants
	Ambient Temperature	-10°C to 50°C for HD, -10°C to 40°C for ND
	Storage Temperature	-20°C to 65°C
	PCB Protection	Conformal Coating complying to IEC 60721-3-3 class 3C2
	Application Humidity	Below relative humidity 90% RH (no condensation)
	Altitude	Below 1000m
	Vibration	5.9m/sec ² (0.6G)
Global Compliance	CE, UL, RoHS	

➤ PLC Card (LTAD-PLC-F)

- 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)



➤ Encoder Card (LTEN-INC-F)

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



➤ 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 1 (LTIO-EX1-F)

- Digital input - 3 (PNP / NPN)
- Digital output - 3 (NO) AC 250V - 5A / DC 30V - 5A
- Analog input - 2, 1 Voltage (-10 to +10V)
1 Current (0 to 20mA)
- Analog output - 2, 1 Voltage (-10 to +10V)
1 Current (0 to 20mA)



➤ I/O Expansion Card 2 (LTIO-EX2-F)

- Digital output - 2 (TR) Max 26V, 100mA
- Analog input - 4, Voltage (-10 to +10V) /
Current (0 to 20mA)
- Analog output - 4, 2 Voltage (-10 to +10V)
2 Current (0 to 20mA)



› 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 (0~20mA) 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)



› Synchronization Option Card (LTCN-SYN-F)

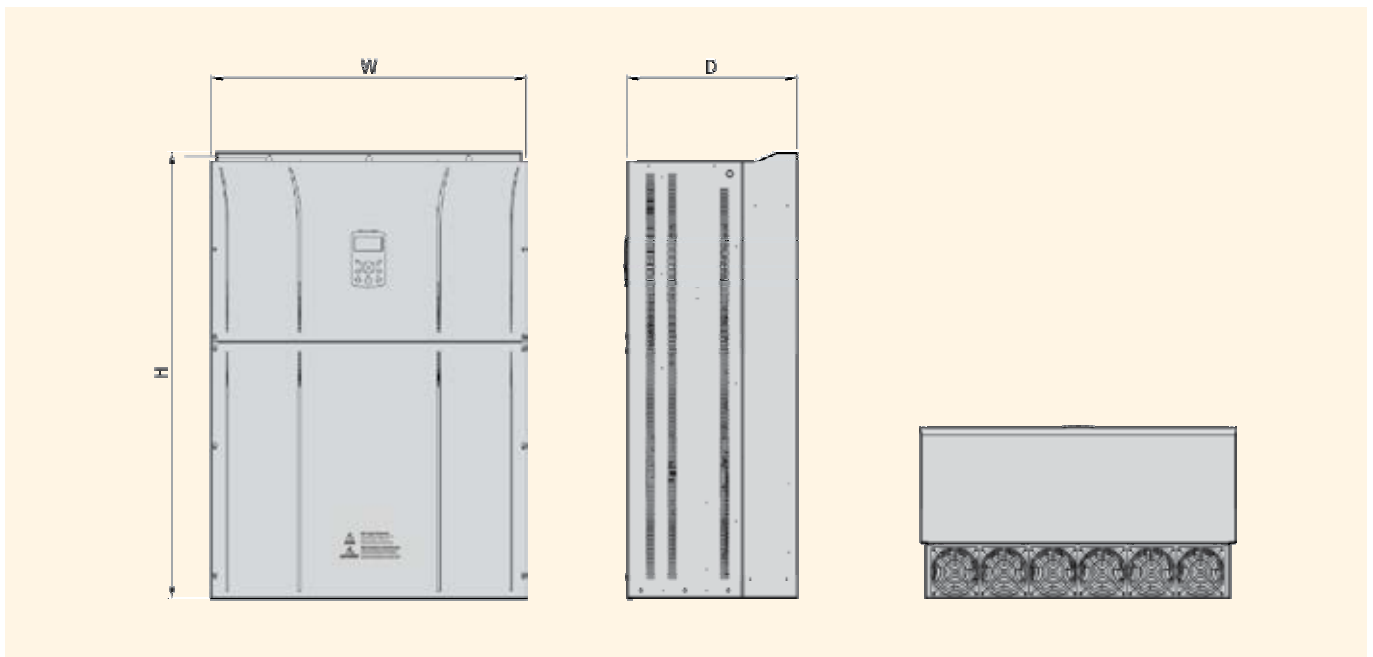
- Closed-loop control
- 100kHz max. input frequency
- For parallel connection 15 slaves per master (5 parallel max)
- For serial connection 5 slaves per master
- Position/Speed synchronization
- Synchronization hold (only slave)
- Open collector output: 26V/100mA (2 points)



› Position Control Option Card (LTCN-PCN-F)

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





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 drawings are solely for reference purposes. Please refer to the technical manual.

Ex2000



The Ex2000 adds a new dimension to L&T's AC drive solutions. Built to L&T's stringent quality standards, the Ex2000 is tested and certified to meet global benchmarks, giving you the assurance of total reliability.

Specially designed for industrial applications, the Ex2000 is perfectly suited for fan and pump applications. It can handle loads up to 450 kW, 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. It has features that save energy and cost, and is easy to operate.

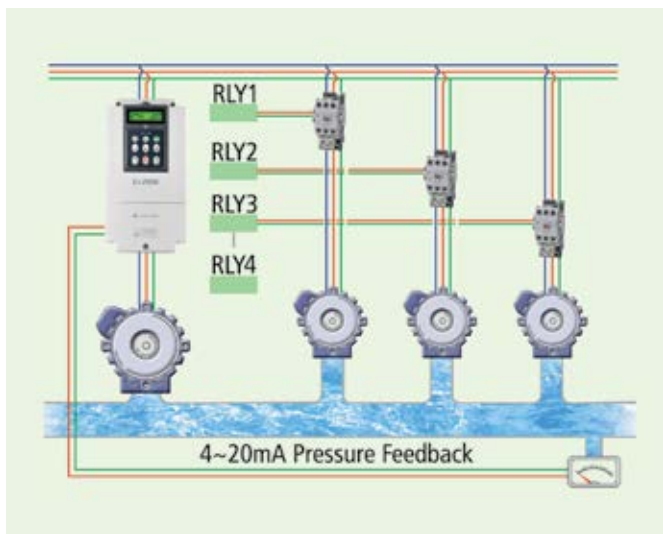


› Main Features

- Range: 5.5kW to 450kW
- Specialized functions for fan & pump
- Energy-saving, high-efficiency
- Built-in Booster pump control
- Cascade PID
- Component Life Monitor
- Built-in DC Reactor from 22 to 280 kW
- VFD Bypass
- Removable control terminal
- Cooling Fan control
- Conformal Coating complying to IEC 60721-3-3 class 3C2
- Built-in RS485 MODBUS (ASCII) Communication

› Applications

- Fan
- Pump
- Blowers
- Compressors

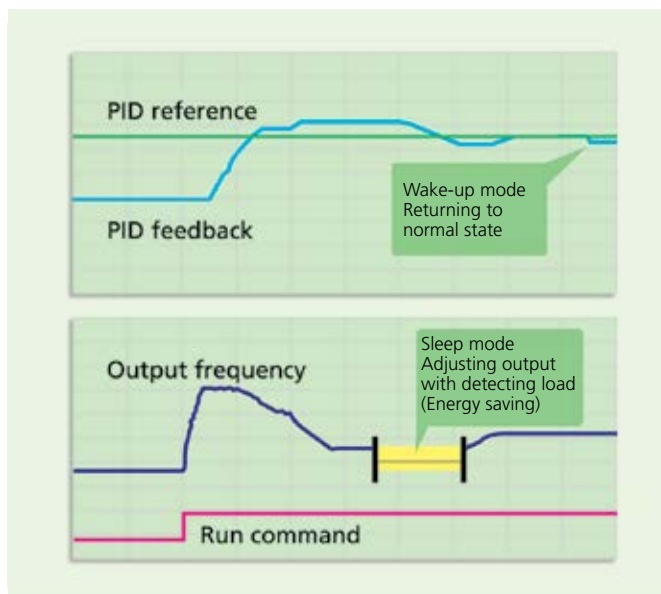


› **Booster Pump Control (Multi Motor Control - MMC)**

The Ex2000 MMC function provides a cost-effective solution. Simultaneous control of multiple motors, i.e. one main motor and four auxiliary motors. Improves efficiency and life of the system.

› **Sleep and Wake-up**

Energy savings are obtained through the sleep and wake-up functions, which enable the drive to automatically switch off during user-programmed low-load conditions and then to start up again when process demand increases.



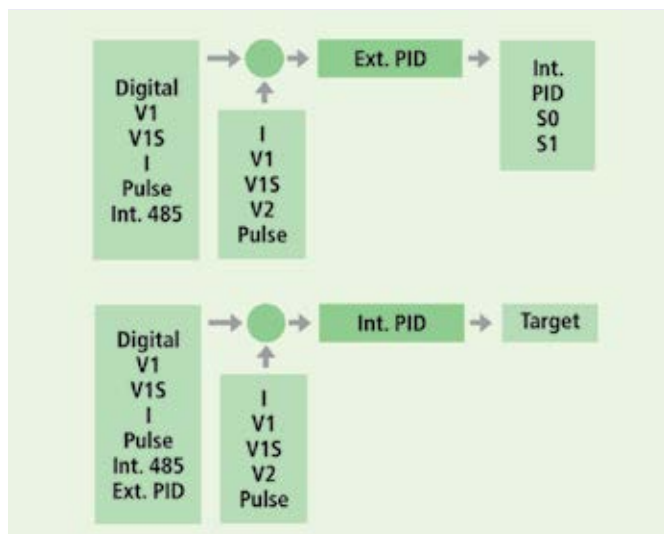
› **Pre-Heat Function**

When using the drive in damp conditions, this function protects the motor from moisture accumulated on its surface. The Ex2000 drive provides low DC Voltage to the motor windings.



› **Flying Start**

The Ex2000 detects the motor speed after a momentary power failure, enabling the motors to be smoothly re-accelerated without mechanical and electrical shock-loading to the system.



› PID Control

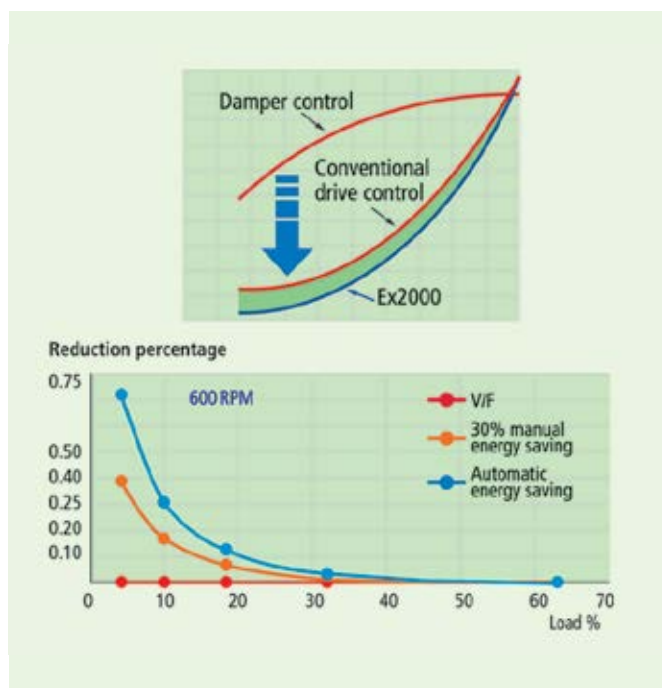
In the centrifugal fan and pump, PID control is provided as a standard function in order to maintain a constant pressure, flow or level. This block includes pre-PID, sleep, wake-up and output inverse sub-functions.

› Dual PID

Where external or cascaded PID control is required, the built-in dual PID algorithm of the Ex2000 can be utilised to satisfy various system requirements.

› Automatic Energy Saving

Load change may incur energy losses. But the optimised flux control of the Ex2000 results in more outstanding energy-saving compared to previous models.



› KEB Safety Stop

During an unexpected power failure, the Ex2000 can bring the load to a controlled stop by utilising the inertial energy. This can prevent further process problems or accidents.

› Automatic Carrier Frequency Change

By taking ambient temperature into account, the Ex2000 can automatically adjust the carrier (modulation) frequency.

➤ Input and Output: **Input Voltage Three-Phase 415V (5.5 to 90kW - ND)**

LTVF-E4□□□□ □AA				0012	0016	0024	0030	0039	0045	0061	0075	0091	0110	0152	0183	
Capacity [kVA] ¹⁾				9.6	12.7	19.1	23.9	31.1	35.9	48.6	59.8	72.5	87.6	121.1	145.8	
Output ratings	Fan or pump load	Applicable Motor ²⁾	(HP)	7.5	10	15	20	25	30	40	50	60	75	100	125	
			(kW)	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	
		Current [A]			12	16	24	30	39	45	61	75	91	110	152	183
		(110% over current)		110% for 1 Minute (Normal Duty)												
	General load	Applicable Motor	(HP)	5.0	7.5	10	15	20	25	30	40	50	60	75	100	
			(kW)	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	
		Current [A]			8.8	12	16	24	30	39	45	61	75	91	110	152
		(150% over current)		150% for 1 Minute (Heavy Duty)												
Frequency				0.01~120 Hz												
Voltage				380~480V ³⁾												
Input ratings	Voltage				3-Phase 380~480V (-15%~+10%)											
	Frequency				50/60 Hz (± 5%)											
Protection degree				IP20						IP00						
DC Reactor				External [option]						Built-in						

➤ Input and Output: **Input Voltage Three-Phase 415V (110 to 450kW - ND)**

LTVF-E4□□□□ □AA				0223	0264	0325	0432	0547	0613	0731	0877	
Capacity [kVA] ¹⁾				178	210	259	344	436	488	582	699	
Output ratings	Fan or pump load	Applicable Motor ²⁾	(HP)	150	200	250	300	350	400	500	600	
			(kW)	110	132	160	220	280	315	375	450	
		Current [A]			223	264	325	432	547	613	731	877
		(110% over current)		110% for 1 Minute (Normal Duty)								
	General load	Applicable Motor	(HP)	125	150	200	250	300	350	400	500	
			(kW)	90	110	132	160	220	280	315	375	
		Current [A]			183	223	264	325	432	547	613	731
		(150% over current)		150% for 1 Minute (Heavy Duty)								
Frequency				0.01~120 Hz								
Voltage				380~480V ³⁾								
Input ratings	Voltage				3-Phase 380~480V (-15%~+10%)							
	Frequency				50/60 Hz (± 5%)							
Protection degree				IP00								
DC Reactor				Built-in				External [option]				

1) Rated capacity (1.732 x V x I) is based on 460V.

2) Indicates the maximum applicable capacity when using a 4-Pole motor.

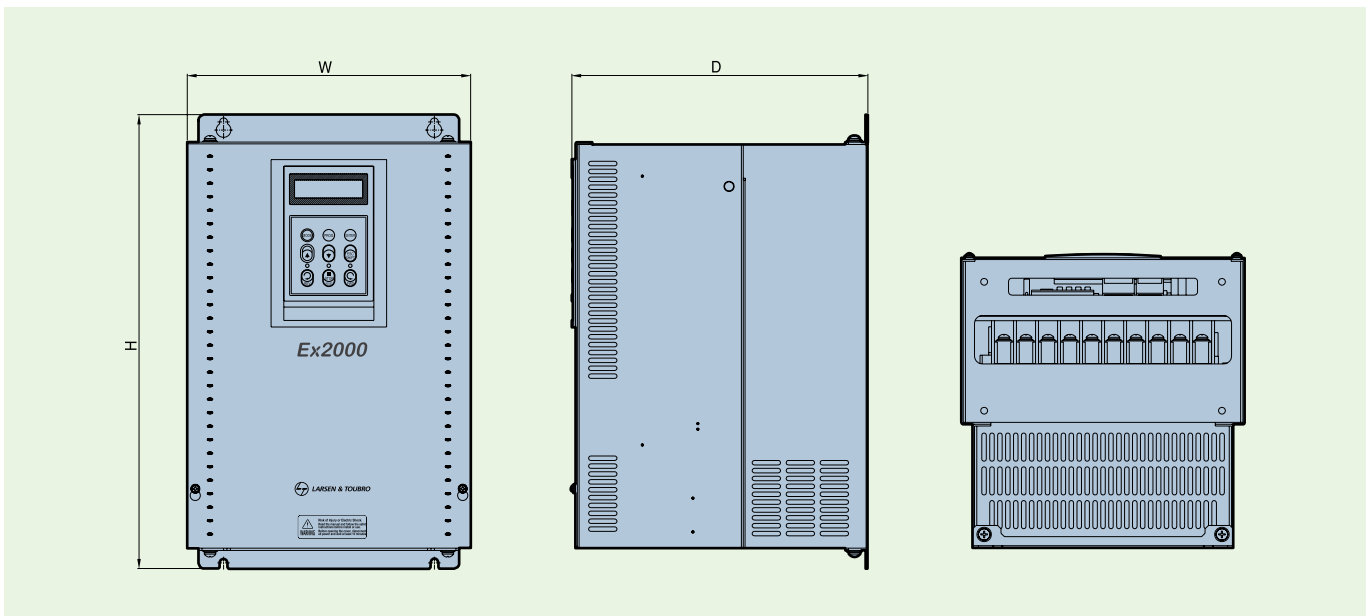
3) Maximum output voltage will not exceed the input voltage. An output voltage less than the input voltage may be programmed if necessary.

	Range	Three-Phase 415V, 0.75 to 450 kW (ND)
Standard Specifications	Enclosure Type	IP20 till 11kW & IP00 till 450kW
	Overload Capacity	HD: 150%/ 1min; ND: 110%/ 1min
	Max Output Voltage	Proportional to Input Voltage
	Max Output Frequency	0.01 to 120 Hz
	Rated Voltage	380 to 480V Three-phase (-15%/+10%)
	Rated Frequency	50/60Hz (-5/+5%)
	Keypad	Detachable LCD
	DC Reactor	Built-in 22 to 280kW (ND)
	Control Details	Control Method
Starting Torque		200% at 0.5Hz for Sensorless Control
Frequency Control Range		0.01 to 120Hz
Frequency Precision Setting		Digital Reference: 0.01 Hz (Below 100 Hz), 0.1 Hz (Over 100 Hz) Analog Reference: 0.01 Hz / 60 Hz
Frequency Setting		Analog: 0 to 12V / -12V to 12V / 4 to 20mA or 0 to 20mA/ Pulse / Ext-PID Digital: Keypad
Output Frequency Resolution		0.01Hz below 100Hz, 0.1Hz over 100Hz
V/F pattern		Linear, Squared Pattern, User V/F
Accel/Decel Time		0.0 to 6000 Sec, Accel/Decel Pattern: Linear, U-Curve, S-Curve Selectable
Features		DC braking, frequency limit, frequency jump, 2nd function, slip, compensation, reverse rotation prevention, auto restart, inverter by-pass, auto-tuning, PID control, flying start, safety stop, flux braking, low leakage, pre-PID, dual-PID, MMC, easy start, pre-heater
Protection	Faults	Over voltage, low voltage, over current, ground fault, inverter overheat, motor overheat, output phase open, overload protection, external fault 1, 2, communication error, loss of speed command, hardware fault
	Alarm	Stall prevention, overload alarm, thermal sensor fault
	Trip Information	Max. 5 Faults are saved
Interface	DI	8 (Programmable NPN/PNP)
	DO	4 (R) (Programmable NO/NC) + 1 (TR)
	AI	1Nos, 4-20mA & 1Nos, 0 to 10Vdc
	AO	2 (0 to 10Vdc)
	Pulse Train	1 I/P & 1 O/P (0 to 32Khz)
	Communication	Built-in RS485 Modbus (ASCII)
Environment	Area of Use	Indoor. Pollution degree 2, No Corrosive Gas, Combustible Gas, Oil Mist, or Dust
	PCB Protection	Conformal Coating complying to IEC 60721-3-3 class 3C2
	Ambient Temperature	-10°C to 50°C for HD, -10°C to 40°C for ND
	Storage Temperature	-20°C to 65°C
	Application Humidity	Below relative humidity 90% RH (no condensation)
	Altitude	Below 1000m
	Vibration	5.9m/sec ² (0.6G)
Global Compliance	CE, UL, RoHS	

Optional Cards

Communication card	DEVICENET (LTCI-DEN-E)	DEVICENET communication card
	PROFIBUS (LTCI-PDP-E)	PROFIBUS communication card
	MODBUS_TCP (LTCI-TCP-E)	MODBUS_TCP communication card
	MODBUS_RTU (LTCI-MOD-E)	MODBUS_RTU communication card

Dimension & Weights



Drive Cat. No.	W (mm)	H (mm)	D (mm)	Weight (kg)
LTVF-E40012BAA	150	284	156.5	5
LTVF-E40016BAA	200	284	182	6.1
LTVF-E40024BAA	200	284	182	6.1
LTVF-E40030AAA	250	385	201	12.6
LTVF-E40039AAA	250	385	201	13.1
LTVF-E40045AAA	260	480	268.6	26.6
LTVF-E40061AAA	260	480	268.6	26.6
LTVF-E40075AAA	300	684	265.6	39
LTVF-E40091AAA	300	684	265.6	39.8
LTVF-E40110AAA	300	684	292.6	41.5
LTVF-E40152AAA	370	760	337.6	67
LTVF-E40183AAA	370	760	337.6	68
LTVF-E40223AAA	510	784	422.6	101
LTVF-E40264AAA	510	784	422.6	101
LTVF-E40325AAA	510	861	422.6	114
LTVF-E40432AAA	690	1,078	449.6	200
LTVF-E40547AAA	690	1,078	449.6	200
LTVF-E40613AAA	772	1,140	422	243
LTVF-E40731AAA	922	1,302.50	495	380
LTVF-E40877AAA	922	1,302.50	495	380

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

Accessories for AC Drives

Suitable for Drive	Description	CAT No.
Cx2000	LED Digital Operator with 3m cable	LTOP-DOP-50
Sx2000	LCD Digital Operator	LTOP-DOP-200
	I/O Expansion Card for Sx2000 (3DI, 2DO, 2AI, 1AO)	LTIO-EXP-S.
	CANOpen Communication card	LTCI-CAN-S
	Profibus-DP Communication card	LTCI-PDP-S.
	Ethernet IP - Modbus TCP Communication card	LTCI-ETH-S
Fx2000	LCD Digital Operator	LTOP-DOP-200
	I/O Expansion Card 1 for Fx2000	LTIO-EX1-F
	I/O Expansion Card 2 for Fx2000	LTIO-EX2-F
	Synchronization Option Card	LTCN-SYN-F
	Position control option card for Fx2000	LTCN-PCN-F
	Incremental card for Open collector and Line Driver Encoder	LTEN-INC-F
	Profibus-DP Communication Interface card	LTCI-PDP-F
	Application Development PLC Option card	LTAD-PLC-F
	CANOpen Communication Interface card	LTCI-CAN-F
	DeviceNet Communication Interface card	LTCI-DEN-F
	Ethernet IP/Modbus TCP Communication Interface card	LTCI-ETH-F
Ex2000	LCD Digital Operator	LTOP-DOP-100
	Modbus RTU Communication Card	LTCI-MOD-E
	Modbus TCP Communication Card	LTCI-TCP-E
	Profibus-DP Communication Interface card	LTCI-PDP-E
	DeviceNet Communication Interface card	LTCI-DEN-E
DBU for Sx2000, Fx2000	Dynamic Braking Unit for 11 - 15kW	LTDBU-0150-4
	Dynamic Braking Unit for 18.5 - 22kW	LTDBU-0220-4
	Dynamic Braking Unit for 30 - 37kW	LTDBU-0370-4
	Dynamic Braking Unit for 45 - 55kW	LTDBU-0550-4
	Dynamic Braking Unit for 75kW	LTDBU-0750-4
	Dynamic Braking Unit for 220 - 375kW	LTDBU-2200-4

DBU & DBR Selection Chart for Cx2000, Sx2000 & Fx2000

Inverter Capacity (1)	Motor (HD) kW	Dynamic Braking Unit		Specifications of the Breaking Resistor when ED is 5%		Specifications for Crane / Hoist *(2)	
		DBU Cat. No.	Qty	Resistor [Ω]	Qty	Resistor [Ω]	Qty
LTVF-C40002BAA	0.4	Built-in		1200 Ω - 100 W	1	-	-
LTVF-S40002BAA				1200 Ω - 100 W	1	-	-
LTVF-C40003BAA	0.75			600 Ω - 150 W	1	-	-
LTVF-S40003BAA				600 Ω - 150 W	1	600 Ω - 450 W	1
LTVF-F40004CAA	1.5			600 Ω - 150 W	1	600 Ω - 450 W	1
LTVF-C40005BAA				300 Ω - 300 W	1	-	-
LTVF-S40005BAA	2.2			300 Ω - 300 W	1	300 Ω - 900 W	1
LTVF-F40006CAA				300 Ω - 300 W	1	300 Ω - 900 W	1
LTVF-C40007BAA	3.7			200 Ω - 400 W	1	-	-
LTVF-S40007BAA				200 Ω - 400 W	1	200 Ω - 1200 W	1
LTVF-F40008CAA	4			200 Ω - 400 W	1	200 Ω - 1200 W	1
LTVF-C40010BAA				130 Ω - 600 W	1	-	-
LTVF-S40010BAA	5.5			130 Ω - 600 W	1	130 Ω - 2000 W	1
LTVF-F40012CAA				85 Ω - 1000 W	1	-	-
LTVF-C40016BAA	7.5			85 Ω - 1000 W	1	85 Ω - 3000 W	1
LTVF-S40016BAA				85 Ω - 1000 W	1	85 Ω - 3000 W	1
LTVF-F40016CAA	11			60 Ω - 1200 W	1	-	-
LTVF-C40023BAA				60 Ω - 1200 W	1	60 Ω - 4000 W	1
LTVF-S40023BAA	15			60 Ω - 1200 W	1	60 Ω - 4000 W	1
LTVF-F40024CAA				40 Ω - 2000 W	1	40 Ω - 6000 W	1
LTVF-C40030BAA	18.5	40 Ω - 2000 W	1	40 Ω - 6000 W	1		
LTVF-S40030CAA		30 Ω - 2400 W	1	30 Ω - 8000 W	1		
LTVF-F40038BAA	22	30 Ω - 2400 W	1	30 Ω - 8000 W	1		
LTVF-C40039CAA		20 Ω - 3600 W	1	20 Ω - 10000 W	1		
LTVF-S40044BAA	30	20 Ω - 3600 W	1	20 Ω - 10000 W	1		
LTVF-F40045CAA		20 Ω - 3600 W	1	20 Ω - 12000 W	1		
LTVF-C40058BAA	37	LTDBU-0370-4	1	16.9 Ω - 5000 W	1	16.9 Ω - 17000 W	1
LTVF-S40075BAA		LTDBU-0370-4	1	16.9 Ω - 5000 W	1	16.9 Ω - 17000 W	1
LTVF-F40075CAA	45	LTDBU-0370-4	1	16.9 Ω - 5000 W	1	16.9 Ω - 20000 W	1
LTVF-C40091BAA		LTDBU-0370-4	1	16.9 Ω - 5000 W	1	16.9 Ω - 20000 W	1
LTVF-S40107BAA	55	LTDBU-0550-4	1	11.4 Ω - 10000 W	1	11.4 Ω - 25000 W	1
LTVF-F40110CAA		LTDBU-0550-4	1	11.4 Ω - 10000 W	1	11.4 Ω - 25000 W	1
LTVF-C40142BAA	75	LTDBU-0550-4	1	11.4 Ω - 10000 W	1	11.4 Ω - 30000 W	1
LTVF-S40152CAA		LTDBU-0550-4	1	11.4 Ω - 10000 W	1	11.4 Ω - 30000 W	1
LTVF-F40169BAA	90	LTDBU-0550-4	1	8.4 Ω - 10000 W	1	8.4 Ω - 41000 W	1
LTVF-C40183CAA		LTDBU-0750-4	1	8.4 Ω - 10000 W	1	8.4 Ω - 41000 W	1
LTVF-S40223AAA	110	LTDBU-0550-4	2	11.4 Ω - 15000 W	2	11.4 Ω - 25000 W	2
LTVF-F40264AAA	132	LTDBU-0750-4	2	8.4 Ω - 17000 W	2	8.4 Ω - 30000 W	2
LTVF-C40325AAA	160	LTDBU-0750-4	2	8.4 Ω - 20000 W	2	8.4 Ω - 36000 W	2
LTVF-S40370AAA	185	LTDBU-2200-4	1	2 Ω - 25000 W	1	2 Ω - 96000 W	1
LTVF-F40432AAA	220	LTDBU-2200-4	1	2 Ω - 30000 W	1	2 Ω - 111000 W	1
LTVF-C40547AAA	280	LTDBU-2200-4	1	2 Ω - 30000 W	1	2 Ω - 132000 W	1
LTVF-S40613AAA	315	LTDBU-2200-4	2	2 Ω - 40000 W	2	2 Ω - 84000 W	2
LTVF-F40731AAA	375	LTDBU-2200-4	2	2 Ω - 60000 W	2	2 Ω - 95000 W	2
LTVF-C40877AAA		LTDBU-2200-4	2	2 Ω - 60000 W	2	2 Ω - 113000 W	2

Note: 1) DBR rating for Single-Phase 230Vac drive & Three-Phase 230V drive, contact nearest branch office. *(2) Above DBR chart is for Crane/ Hoist Applications
 3) DBU shall be purchased from L&T however DBR of given values must be purchased from local vendors. 4) For Elevator please contact nearest branch office.

Peripheral Devices

Incomer (MPCB / MCCB) & Magnetic Contactor (MC)

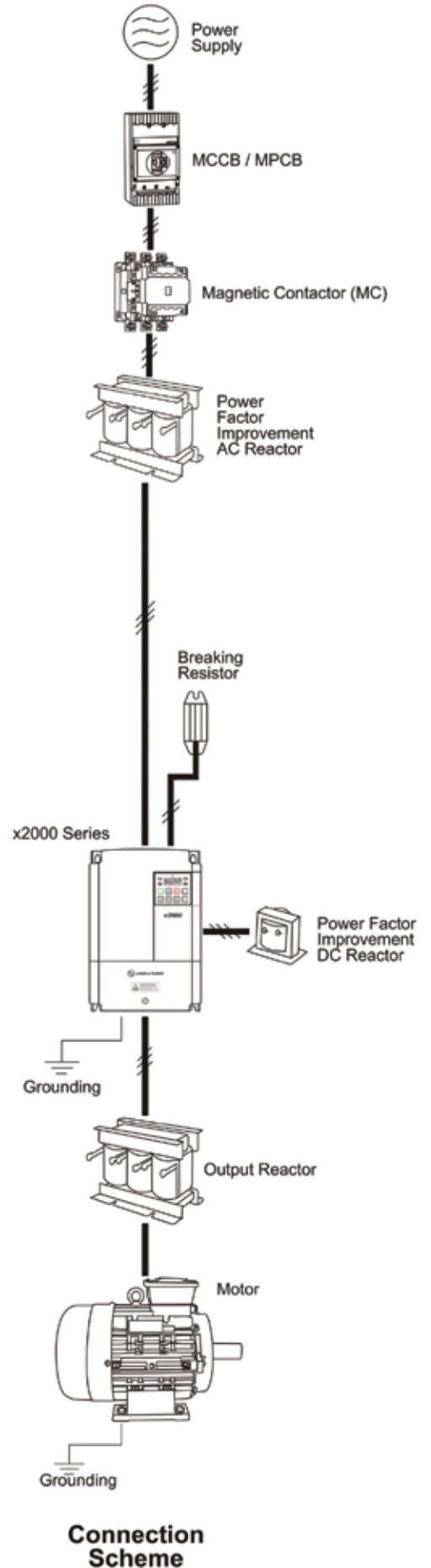
Motor (HD) kW	Specification of Breaker (MPCB / MCCB)				Magnetic Contactor (MC)			
	Heavy Duty		Normal Duty		Heavy Duty		Normal Duty	
	Type	A	Type	A	Type	A	Type	A
0.75	MOG-S1/MOG-H1	2.5 - 4	MOG-S1/MOG-H1	4 - 6.3	MNX	9	MNX	9
1.5	MOG-S1/MOG-H1	4 - 6.3	MOG-S1/MOG-H1	6.3 - 10	MNX	9	MNX	9
2.2	MOG-S1/MOG-H1	6.3 - 10	MOG-S1/MOG-H1	6.3 - 10	MNX	9	MNX	9
3.7	MOG-S1/MOG-H1	6.3 - 10	MOG-H1	11.0 - 16.0	MNX	9	MNX	18
5.5	MOG-H1	11.0 - 16.0	MOG-H1	14 - 20	MNX	18	MNX	18
7.5	MOG-H1	14 - 20	MOG-H1	24 - 32	MNX	18	MNX	25
11	MOG-H1	24-32	MOG-H2	28 - 40	MNX	25	MNX	40
15	MOG-H2	28 - 40	MOG-H2	35 - 50	MNX	40	MNX	45
18.5	MOG-H2	35 - 50	MOG-H2	45 - 63	MNX	45	MNX	50
22	MOG-H2	45 - 63	DN0 - 100M	80	MNX	50	MNX	70
30	DN0 - 100M	80	DN0 - 100M	100	MNX	70	MNX	80
37	DN0 - 100M	100	DN1 - 160M	125	MNX	80	MNX	110
45	DN1 - 160M	125	DN1 - 160M	160	MNX	110	MNX	140
55	DN1 - 160M	160	DN2 - 250M	200	MNX	140	MNX	185
75	DN2 - 250M	200	DN2 - 250M	250	MNX	185	MNX	225
90	DN2 - 250M	250	DN3 - 400M	320	MNX	225	MNX	265
110	DN3 - 400M	320	DN3 - 400M	400	MNX	265	MNX	325
132	DN3 - 400M	400	DN3 - 630M	500	MNX	325	MNX	400
160	DN3 - 630M	500	DN3 - 630M	500	MNX	400	MNX	550
185	DN3 - 630M	500	DN3 - 630M	630	MNX	550	MNX	550
220	DN3 - 630M	630	DN4 - 1250N	320-800	MNX	550	MNX	650
280	DN4 - 1250N	320-800	DN4 - 1250N	400-1000	MNX	650	MNX*	400*
315	DN4 - 1250N	400-1000	DN4 - 1250N	500-1250	MNX*	400*	MNX*	550*
375	DN4 - 1250N	500-1250	DN4 - 1250N	500-1250	MNX*	550*	MNX*	550*

Note:

- 1) MC (Magnetic Contactor) current is 1.3 ~ 1.5 times of Drives rated current
- 2) MCCB should be used to protect against overload and damage of drive installation from the fault current.
- 3) From 22kW to 220kW MCCB dsine with frame size DN0 to DN3 with thermal-magnetic release
& for above 220 kW MCCB dsine with frame DN4 - 1250N is used with MTX1.0 release.
- 4) *2 contactors are used in parallel

Selection Chart for Input and Output Choke

Motor (ND) kW	Drive Current (A)		Chokes			
	Normal Duty	Heavy Duty	I/P AC Choke mH/A	DC Choke mH/A	O/P Choke mH/A	
0.75	2	1.3	4.81 /4.8	16/4.27	8.1/3	
1.1	3.1	2.5	4.81 /4.8	16/4.27	6.54/4.2	
1.5	4	2.5	4.81 /4.8	16/4.27	6.54/5	
2.2	6	4	3.23/7.5	12/6.41	3.71/7	
3	6.9	5.5	3.23/7.5	12/6.41	2.45/8	
3.7	8	6	2.34/10	8/8.9	2.45/9	
4	10	8	1.22/15	5.4/13.2	1.9/12	
5.5	12	8	1.22/15	5.34/14	1.9/12	
7.5	16	12	1.22/18	3.2/17	1.1/18	
11	24	16	0.78/27	2.5/25	0.81/25	
15	30	24	0.59/35	1.9/32	0.54/35	
18.5	39	30	0.46/44	1.4/41	0.45/40	
22	45	39	0.4/52	1.0/49	0.36/46	
30	61	45	0.3/68	0.7/64	0.29/62	
37	75	61	0.232/98	Built-in	0.23/78	
45	91	75	0.195/118		0.2/95	
55	110	91	0.157/142		0.16/115	
75	152	110	0.122/196		0.12/160	
90	183	152	0.096/237		0.12/190	
110	223	183	0.081/289		0.077/230	
132	264	223	0.069/341		0.067/270	
160	325	264	0.057/420		0.050/330	
185	370	325	0.042/558		0.045/380	
220	432	370	0.042/558		0.034/475	
280	547	432	0.029/799		0.033/600	
315	613	547	0.029/799		0.09/836	0.031/630
375	731	613	0.024/952		0.076/996	0.031/800
450	877	731	0.024/952		0.064/1195	0.028/930



Device	Purpose	Details
MCCB or MPCB	To protect inverter wiring	Always install the MCCB or MPCB on the power supply side to protect the inverter from Short Circuit & Overload protection
Magnetic Contactor	For Isolation	Used at Input side to provide complete isolation when drive is switched off thus protecting the internal components. Also used for preventing burning of braking resistor with thermal feedback
Input AC or DC Reactor	To improve Inverter Power Factor	Use for further improving the power factor of the inverter by suppressing the harmonics from the power supply
Output Reactor	To avoid nuisance tripping of inverter	To avoid nuisance tripping of inverter due to leakage current caused because of the capacitive effect in longer cables between inverter & motor
Braking Resistor	To stop the machine within the preset time	Shortens the deceleration time by consuming the regenerative energy of the motor by the resistor
Braking Unit		Used in combination with the braking resistor to reduce the deceleration time of the motor

Other Automation Products

IP66 / NEMA 4X Series:

Sx2000

Sx2000 provides protection against harsh environmental conditions by restricting entry of foreign substances such as fine dust and high-pressure water spray.

Satisfies NEMA standard type 4X for indoor use.

- Range: 0.4kW to 22kW (HD)



HVAC Series:

Hx2000

Hx2000 sets the standard for the drive industry by introducing the Innovative Energy Reduction, Environment friendly & HVAC System that incorporates the outstanding energy saving benefits of the Hx2000 for fan & pump application.

- Range: 0.75kW to 90kW

Lift Series:

Lx2000

The Lx2000 is designed specifically to add power to elevator performance. Built to L&T's stringent quality standards, the Lx2000 is tested and certified to meet global benchmarks, thus giving you the assurance of total reliability. It is engineered to keep your elevator operating at optimum efficiency, even in the hot, humid and dusty conditions that characterise harsh environments.

- Range: 3.7kW to 22kW (HD)



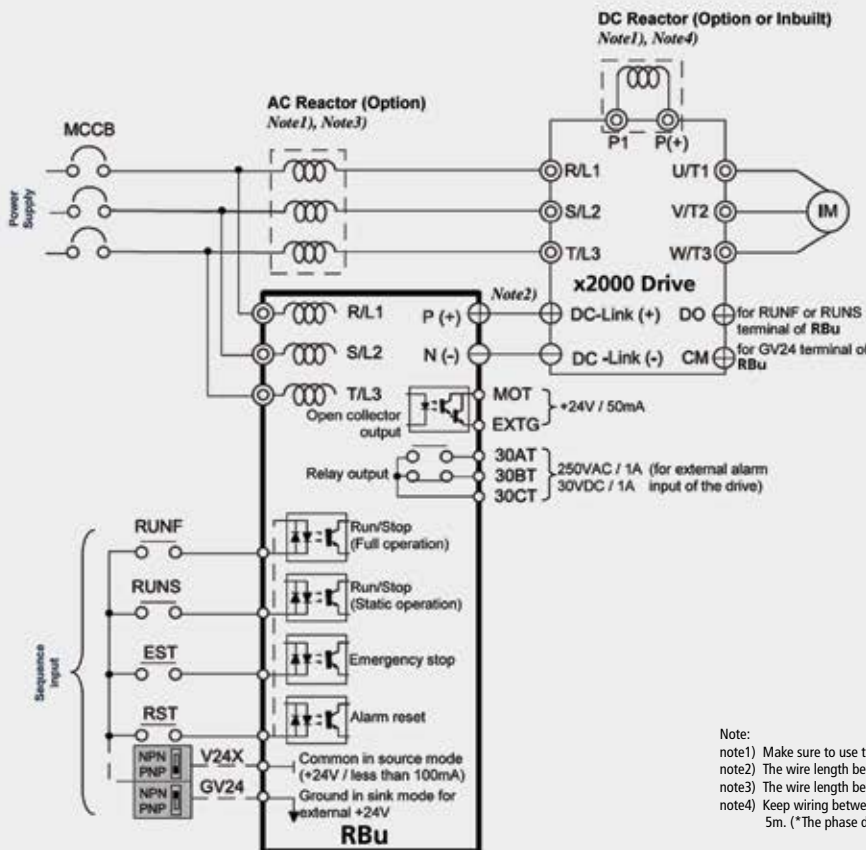
Other Automation Products

Regenerative Braking Unit

RBu

Braking torque: 150% for 1s, 100% for 100s, 35% Continuous operation

Range: 7.5kW to 280kW



Soft Starter: Standard Applications

CSX

Features:

- Built-in Bypass Contactor
- Soft start / Soft stop
- Complements existing motor protection
- Truly plug & play
- Communication options available

Range: 7.5 to 110kW

Other Automation Products

Soft Starter: Standard Applications

CSXi

Feature:

- Built-in bypass contactor
- Soft start / soft stop / adjustable current limit
- Essential motor protections against:
 - Overload & single phasing
 - Instantaneous overcurrent
 - Phase sequence reversal
 - Abnormality in supply
 - Unbalanced current
- Thermistor protection through PTC
- Excess start time setting
- Communication and PC Interface options available

Range: 7.5 to 110kW



Soft Starter

EMX3

Features:

- 3-Phase operation control
- Built-in bypass contactor till 1000A
- XLR-8 adaptive acceleration & deceleration control for pumps
- Conformal coated PCB
- Electronic motor overload protection
- 99 event logs with time stamping, Last 8 trip logs
- Operating Temp 50°C
- 5DI, 4DO, 1AO
- Communication options available
- Control voltage from 94VAC to 484VAC current
- Forward / reverse Jog
- Comprehensive motor protection
- Large LCD detachable keypad
- 2 motor data sets
- Fully programmable overload trip
- Built-in RTD & thermistor inputs
- Auto detection of inline or inside delta power connection
- Programmable auto start/stop
- Power through operation allows to run soft starter even with one SCR shorted
- I/O expansion card (optional)

Applications:

Centrifugal pump, compressors, conveyor, crusher, fan, etc.

Range: 23A to 1600A



Other Automation Products

HMI: Ln Touch

Feature:

- Multilanguage
- Extended alarms, recipe
- Data logging, trends
- Graphics
- Password Protection
- Communication option: Serial / Ethernet / Fieldbus

Range: 4.3" to 15" Touch Screen with 7 models



PLC: LX7 / LX7s

Feature:

- Basic control
- Enables 2 expansion units
- 2 Serial Ports (2 RS232C/RS485 with Modbus RTU)
- Built-in HSC, Pulse Catch, Pulse output (for TR output unit), RTC

Range: 28, 48 & up to 104 I/O points

PLC: LX8

Feature:

- Powerful communication
 - Built-in 100 Mbps Ethernet port
 - Built-in USB port
 - 2 x High-speed serial port (115.2K)
- Built-in HSC & PTO
 - 4CH 100KHz HSC
 - 6CH 100KHz PTO
- Supports 4GB SD memory card
 - Backup to SD card (data Log, program), recipe
- Web monitoring
- Supports various communication protocols
 - Ethernet based protocols: etherNet/IP, modbus/TCP, HTTP (Web) server
 - Serial protocol: Modbus/RTU, ASCII
- Built-in PID function
- 3-layered security function
 - Combination of 12 bytes of alphabets, numbers, and symbols
 - Password-assignable : master password, system password & password for each ladder
- Expandable IO module like remote I/O
- LXGPC – programming software
- Online editing (insert, delete, modify, undo)



Range: 14 to 2560 I/O points

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