Lauritz Knudsen
Electrical & Automation

Driven by **Legacy,** **Engineered** for **Tomorrow**

TECHNICAL CATALOGUE

VARIABLE FREQUENCY DRIVES

(xD Series)

ABOUT US

Lauritz Knudsen Electrical & Automation, formerly known as L&T Switchgear, is a leading player in the Indian Electrical industry, drawing strength from over 70 years of rich heritage and a steadfast dedication to contributing towards the growth of India. The brand currently exports to 30 + countries and is dedicated to providing a wide range of electrical and automation solutions to vital sectors of the economy, including industries, utilities, infrastructure, buildings, and agriculture. Our extensive portfolio includes low-voltage and medium-voltage switchgear, automation solutions, tailored software, and services.

With **multiple manufacturing facilities in India, we adhere to global standards of excellence.** Our operations are supported by well-equipped, in-house design and development centers, as well as tooling facilities, ensuring precision in manufacturing.

With a strong global footprint, supported by an expansive electrical distribution network in India and worldwide, our ambition is to foster excellence and provide top-tier products and solutions that drive the progress of nations globally.

We Listen. We Partner. We Innovate.

40+ YEARS OF EXPERTISE & LEGACY

PRODUCT SOLUTIONS FOR ALL INDUSTRIES

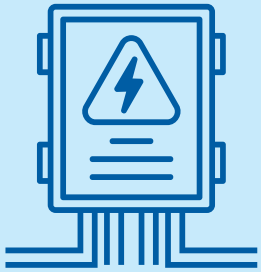
INDIGENOUS PRODUCT

xD series VFD Family

Introducing xD series, designed to optimize motor control and enhance energy efficiency across a wide range of applications. These drives offer advanced features, user-friendly interfaces, and robust performance, making them ideal for various industries, from HVAC and water treatment to manufacturing and process automation. With their ability to precisely control motor speed and torque, these VFDs not only improve operational efficiency but also contribute to significant energy savings.

Customer Benefits

Panel Builder



Compact Design: Width Reduction up to 10%
Lowers fabrication costs
Reduces freight and forwarding expenses
Minimizes panel size, making it ideal for compact rooms at the end-user location

Detachable Graphical Display with Help Menu
Eliminates the need for an optional keypad, reducing cost and handling time
Enhances the panel's aesthetics
Simplifies programming
Facilitates easy duplication of parameters between drives

Built-in DC Reactor, EMC Filter, and Braking Unit
Reduces material costs (reactor, filter, braking unit, sheet metal, cables/busbars)
Lowers labor costs

Color-Coded Strips on Control Terminals
Enables quick and easy terminal identification
Ensures error-free connections

End User

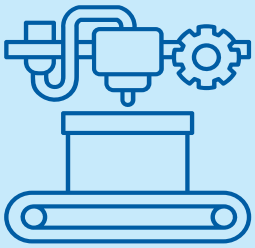
Detachable Graphical Display with Help Menu & QR Code for Faults
Makes programming and troubleshooting effortless with a user-friendly help menu
Enhances performance monitoring using bar and graphical indicators
Effortless fault code interpretation via QR codes linking to a webpage with detailed explanations
Enables quick parameter duplication between drives

Built-in DC Reactor, EMC Filter & Braking Unit
Significantly reduces harmonics and improves input power factor
Lowers maintenance requirements with built-in hardware

Color-Coded Strips on Control Terminals
Facilitates quick and easy terminal identification
Simplifies troubleshooting and maintenance

Built-in & Optional Networking Protocols
Dual-port Modbus TCP/Ethernet IP with media redundancy support (xD3000/xD4000)
Profinet S2 option module for system redundancy support (xD4000)
Integrated Modbus RS485 port

Machine Builder



Integrated Safety Features
STO, SLS, SS1, SMS, GDL with additional option card
Ensures machine and personnel safety

Multi-Motor Control
Controls more than one motor with one drive,by changing all the relevant parameters and settings automatically.

Higher Speed Range
Supports up to 599 Hz for high-speed applications

Optimized energy efficiency
User can monitor the hourly, daily and cumulative energy consumption via kWh counters.

Flexible connectivity
Supports all major Fieldbus protocols like Modbus RTU, CANopen, Modbus TCP, Ethernet IP, DeviceNet, PROFIBUS, PROFINET, etc.

Contents

xD1000

xD1000 Series

Range: 0.37kW HD ~ 30kW ND

The xD1000 Drive is a compact yet robust variable frequency drive (VFD) designed to meet the needs of various general-purpose applications such as pump, fan, conveyor & compressors cutting across Industry & Building segments. It is also capable to handle machine applications like F&B machines, packaging machines, woodworking machines, textile machines, special purpose machines etc. It offers a user-friendly interface that simplifies installation and operation, making it accessible for both experienced and novice users. The xD1000 is equipped with advanced motor control features that enhance performance while optimizing energy consumption, contributing to lower operational costs. With its robust design and adaptability, the xD1000 Drive is an excellent choice for improving energy efficiency and reliability in diverse environments.

User benefits

Easy to install, Easy to use & Easy to maintain

- Smaller footprint for compact enclosures
- Clear identification of power terminals
- 4 digit LED Display with operation indicator text on both sides
- Remote terminal cover with
  - Wiring details
  - Lock arrangements for Start Stop & Mode buttons
  - Short programming menu list
- Quick start guide and full parameter list inside packing box
- Easy removal cooling fan

General purpose functions

- Slip Compensation
- Acceleration Profiles :
  - Linear
  - S Curve
  - U curve
- 8 Preset Speeds
- Auto Restart
- Cooling Fan Control
- Fast Stop (Ramp Divider)
- Skip (Jump) Frequency
- Torque boost
- Stall prevention :
  - Deceleration ramp time adaptation
  - Current limit during running
- DC braking (during stopping)

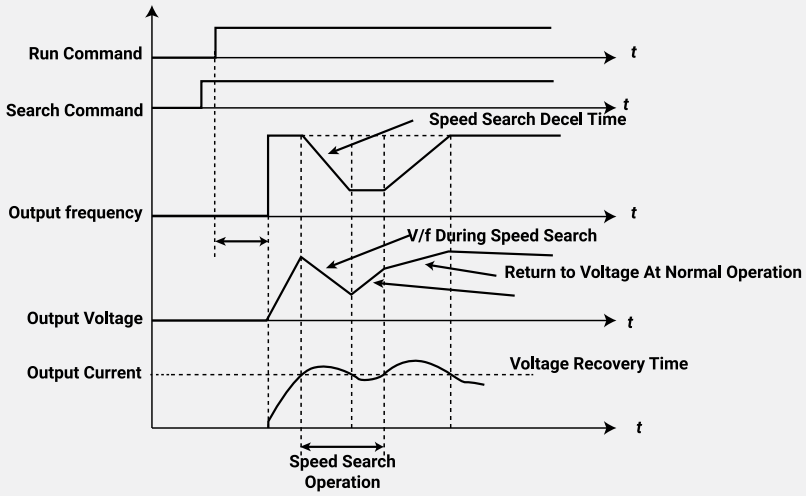
Application specific functions

Fault inhibition (Fire mode)
The applications like Tunnel Ventilation Fan, Smoke Extraction Fan, Fire Fighting Pump the monitoring functions of the drive may be unwanted because they impede the purpose of the application.

User benefits

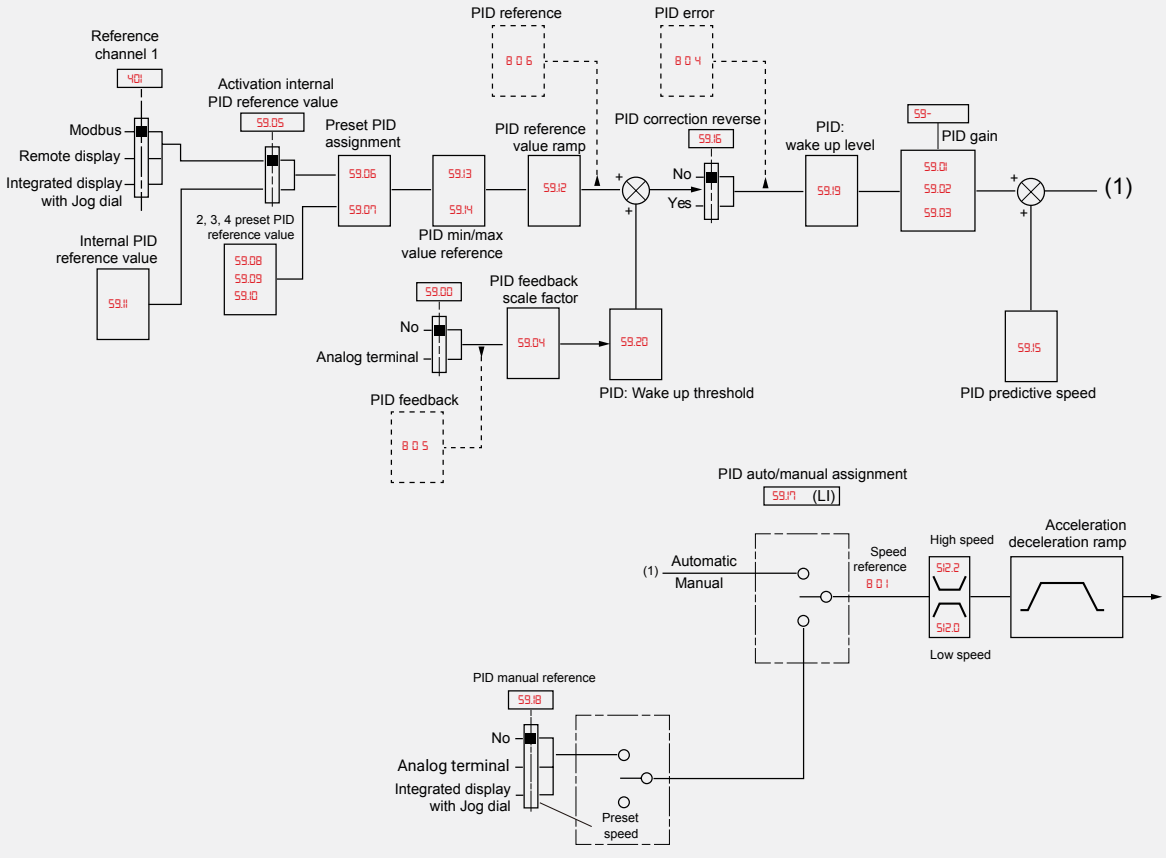
Catch on the fly (speed search / flying start)

Drive capable of reliable and smooth re-starts even for bidirectional rotating loads. Like Fan, AHU, Reactor, Centrifuge of the application.



Built-in PID : AHU, Fan, Pump, Compressor

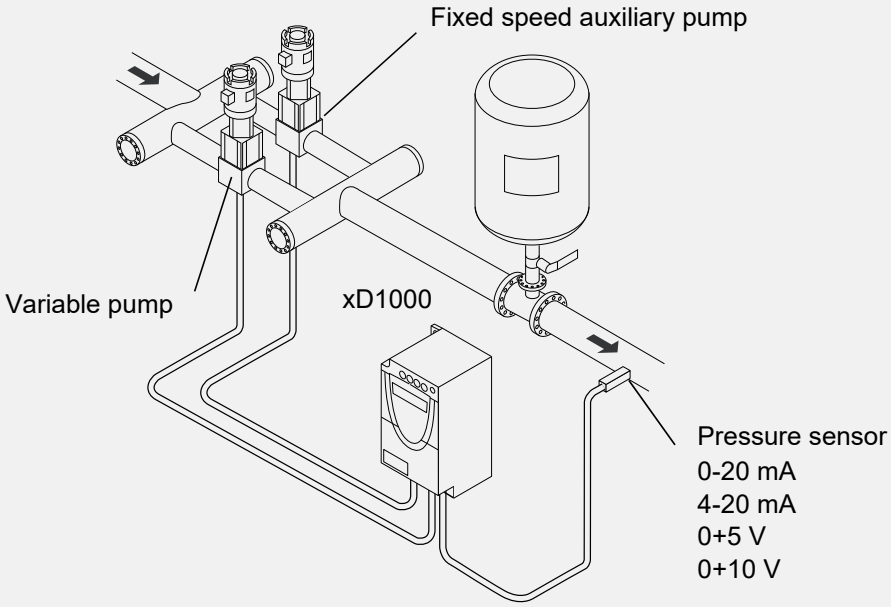
- 4 preset PID reference using digital inputs
- Wake up & sleep mode
- PID predictive speed (Pre-PID frequency)

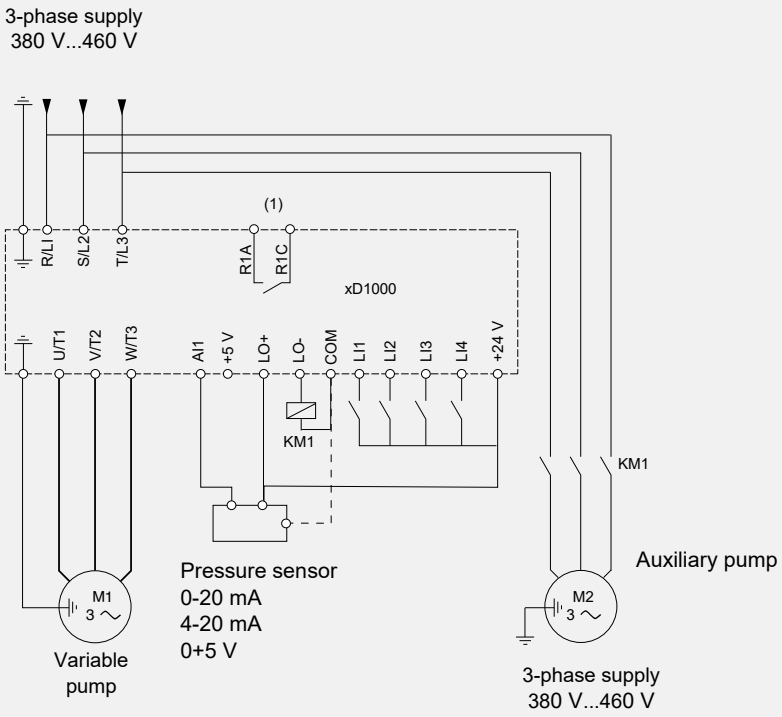


User benefits

Auxiliary pump function (1 master + 1 slave)

The system is operated using an auxiliary fixed speed pump, and one variable speed pump, which is unable to provide the full flow range required on its own.

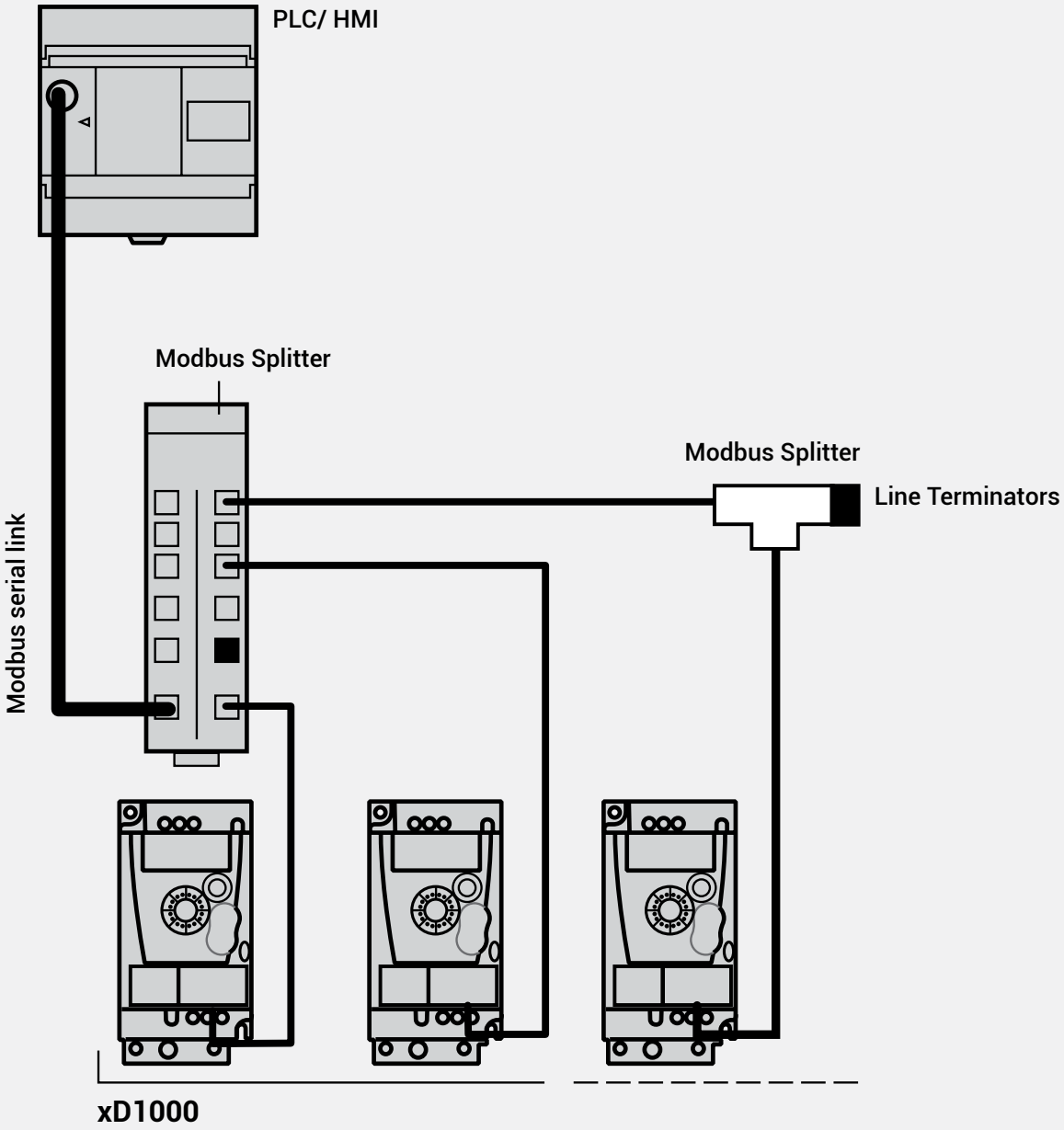




(1) Fault relay contacts, for remote indication of the drive status.

Network architecture

Modbus RTU Serial link Protocol



Current & Power Ratings

Input : 3-Phase, 380-460VAC (-15%, +10%), 50/60Hz (±5%)										
CAT No.	Rated Output(1)						Rated Input			
	P_{ND}	I_{ND}	P_{HD}	I_{HD}	Apparent Power at 460V		I_{ND} at 380V	I_{HD} at 380V	I_{ND} at 460V	I_{HD} at 460V
	(kW)	(A)	(kW)	(A)	kVA (ND)	kVA (HD)	(A)	(A)	(A)	(A)
XD1000-01P5-4B1111	NA	NA	0.37	1.5	NA	1.4	NA	2.10	NA	1.80
XD1000-02P3-4B1111	NA	NA	0.75	2.3	NA	2.5	NA	3.50	NA	3.10
XD1000-04P1-4B2111	NA	NA	1.5	4.1	NA	4.3	NA	6.50	NA	5.40
XD1000-05P5-4B2111	NA	NA	2.2	5.5	NA	5.7	NA	8.80	NA	7.20
XD1000-08P9-4B2111	4.0	8.9	3.0	7.1	9.3	7.3	14.2	11.1	11.6	9.20
XD1000-12P1-4B2111	5.5	12.1	4.0	9.5	15.1	9.1	18.0	13.7	14.9	11.4
XD1000-16P0-4B2111	7.5	16.0	5.5	12.6	15.1	11.4	23.0	21.3	19.0	14.3
XD1000-22P8-4B2111	11	22.8	7.5	17.0	19.4	17.8	29.5	26.6	24.8	22.4
XD1000-30P0-4B2111	15	30.0	11	24.0	25.4	24.2	38.6	36.1	32.5	30.4
XD1000-36P0-4B2111	18.5	36.0	15	33.0	31.2	30.7	46.6	46.5	38.8	38.5
XD1000-43P0-4B2111	22	43.0	18.5	39.0	35.7	36.5	54.1	55.3	45.1	45.8
XD1000-60P0-4B2111	30	60.0	22	46.0	47.0	46.2	71.2	64.2	59.2	53.2

NORMAL DUTY USE	
I_{ND}	Continuous current with 110% overload for 60 secs.
P_{ND}	Maximum capacity in Normal Duty usage

HEAVY DUTY USE	
I_{HD}	Continuous current with 150% overload for 60 secs.
P_{HD}	Maximum capacity in Heavy Duty usage

(1) - These values are given for continuous operation at nominal switching frequency of 4 kHz.
- For continuous operation above 4 kHz, derate the nominal drive current by 10% for 8 kHz and 20% for 12 kHz.
- For all ratings the switching frequency can be set between 2 and 12 kHz.
- In the event of an excessive temperature rise above 4 kHz, the drive will automatically reduce the switching frequency.
- See the derating curves in the User Manual

Technical Specifications

Standard Specifications	
Range	0.37 – 22.0 kW (HD) / 4.00 – 30 kW (ND)
Enclosure type	IP20 without blanking plate on upper part IP4X for top with vent cover
Isolation type	Galvanic Isolation
Overloading Capacity	Heavy Duty : 150% of rated current for 1 min Normal Duty : 110% of rated current for 1 min
Max Output Voltage	Proportional to Input Voltage
Max Output Frequency	400Hz
Rated Voltage	Three Phase 380 – 460 VAC (-15 – +10%)
Rated Frequency	50/60Hz (±5%)
Displacement Power Factor (With Line Choke)	≥ 0.98
True Power Factor (With Line Choke)	≈ 0.89
Efficiency at Rated Load (With Line Choke)	95 – 98%
%THDi at Rated Load (With Line Choke)	35.1 – 44.6% at 380V ND
Built-In Keypad	4 digit, 7 segment LED
Optional Keypad	4 digit, 7 segment LED, IP54
EMC Filter Category	Without EMC filter External EMC filter is mandatory required to fulfil the IEC/EN 61800-3 C3 category CE : with C3 external filter, max 25m shielded motor cable RE : with C3 external filter, max 5m shielded motor cable

Control Details	
Control Method	V/F (2 Point), Pump U2/F, Sensorless Vector Control (SVC), Slip Compensation
V/F Patterns	Linear, S Ramp, U Ramp
Acceleration / Deceleration Time	0.0 s – 999.9 s
Nominal Switching Frequency	4 kHz
Switching Frequency Range	2 – 12 kHz adjustable
Frequency Precision Setting	Display unit: 0.1 Hz Analog input: converter A/D, 10 bits
Output Frequency Resolution	0.1 Hz
Starting Torque	150% at 3 Hz in V/F
Transient Overtorque	170 – 200% of nominal motor torque depending on drive rating and type of motor
Braking Torque	Up to 150% of nominal motor torque with DBR Up to 70% of nominal motor torque without DBR

Protection	
Motor Protection	Overcurrent, Motor short-circuit, Ground short-circuit, Overbraking, 1 Output phase loss, 3 Ph Output phase loss (No motor detection)
Drive Protection	IGBT short circuit, Autotuning fault, Drive overheat, Overvoltage, Undervoltage, Input phase loss, Load short circuit, Modbus interruption, HMI communication, IGBT overheat
Process Protection	Overspeed, Process overload, Process underload, PI feedback fault, AI 4-20 mA current loss

Technical Specifications

Interface		
Logic (Digital) Inputs	Number	4 Nos. (Sink / Source)
	Type	24 Vdc (18 – 30 Vdc), Input Impedance : 3.5 kΩ
	Logic	Negative logic (Sink) : > 16 V (state 0), < 10 V (state 1) Positive logic (source) : 0 < 5 V (state 0), > 11 V (state 1)
	Specifications	Sampling Time : < 20 ms ± 1 ms
Analog Inputs	Number	1 No. (0 – 5 Vdc / 0 – 10 Vdc / 0 – 20 mA / LIU)
	Type	Voltage : 0 – 5 Vdc, (maximum voltage 30 V), impedance : 30 kΩ Voltage : 0 – 10 Vdc, (maximum voltage 30 V), impedance : 30 kΩ Current : 0 – 20 mA, impedance : 250 Ω
	Logic	• Resolution: 10 bits • Precision: ± 1% at 25°C (77°F) • Linearity: ± 0.3% (of full scale) • Sampling time: 10 ms
Digital Outputs	Number	2 Nos. (1 Relay + 1 Logic Output)
	Relay output	1 No. - Form C / Changeover Type
	Capacity	Minimum switching capacity: 5 mA for 24 Vdc Maximum switching capacity: • on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 Vac and 30 Vdc • on resistive load (cos φ = 1 and L/R = 0): 3 A for 250 Vac, 4 A for 30 Vdc Response time: 30ms maximum.
	Transistor Output	1 No. - Transistor Type
	Capacity	Voltage: 24 Vdc (maximum 30 Vdc) • impedance: 1 kΩ • max current output: 100 mA (1) • linearity: ± 1% • sampling time: 20 ms ± 1 ms.
Analog Output	Number	1 No. (0 – 10 Vdc / 0 – 20 mA)
	Type	• Voltage : 0 – +10 Vdc (maximum voltage +1%), impedance: 470 Ω • Current : 0 – 20 mA, impedance: 800 Ω
	Specifications	• Resolution: 8 bits • Precision: ± 1% at 25°C (77°F) • Linearity: ± 0.3% (of full scale) • Sampling time: 4 ms (max. 7 ms)

Technical Specifications

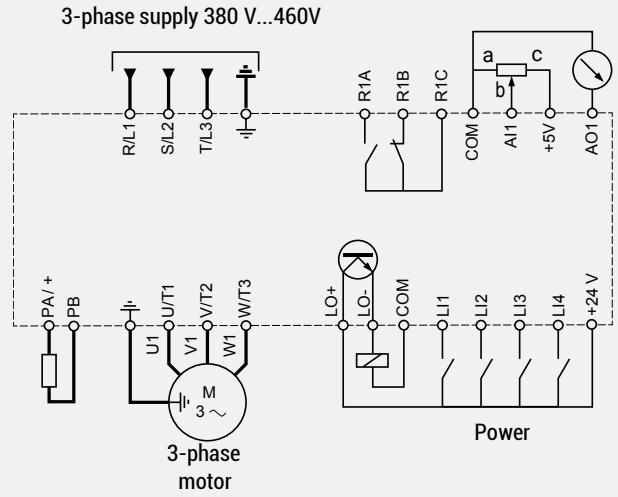
Environment	
Area of Use	Indoors. Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 2 Environment, conforming to IEC 61800-5-1)
Ambient temperature for operation	HD : -10 – +55 °C without derating ND : -10 – +50 °C without derating (remove protective cover from the top of the drive, refer user manual for derating percentage)
Ambient temperature for storage	-25 – +70 °C
PCB Protection	Conformal coating class 3S2 for Dust and class 3C3 for Chemical pollution, complying to IEC 60721-3-3
Relative humidity	5 – 95% without condensation and without dripping water, conforming to IEC 60068-2-3
Altitude 0 to 1,000 m 1,001 to 3,000 m	 Without derating With derating of 1% per additional 100 m
Shock Resistance	15 gn for 11 ms conforming to IEC 60068-2-27
Type of cooling	Forced fan cooling structure except for 0.37 – 0.75 kW (HD)

Communication	
Built-in Communication Protocol	Modbus
Connector Type	RJ45 (on front face) for Modbus
Physical Interface	2-wire RS 485 for Modbus
Transmission Frame	RTU for Modbus
Transmission Rate	4800 – 38400 bps for Modbus

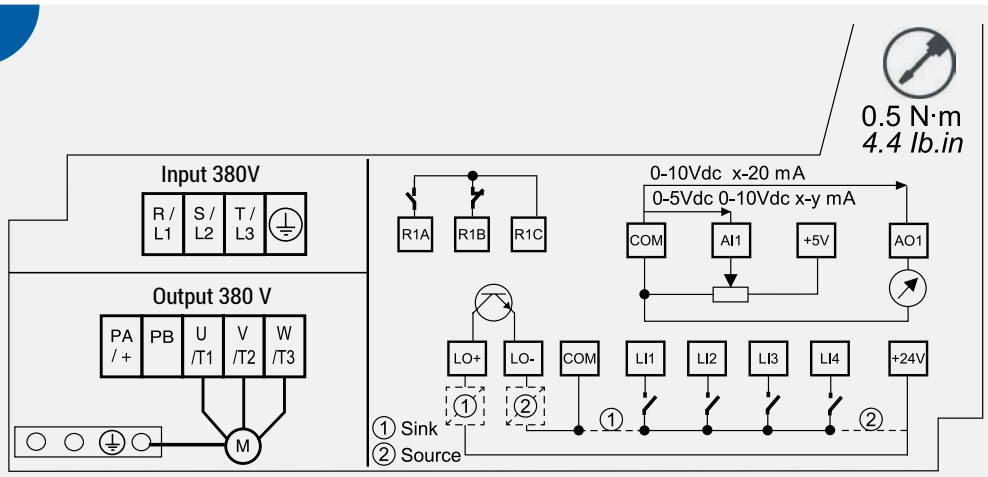
Compliance	
Standards	CE, RoHS
Applicable Standard	IEC 61800-3 IEC 61800-5-1 IEC 60721-3
Electromagnetic Compatibility	IEC 61000-4-2 - Electrostatic discharge immunity test IEC 61000-4-3 - Radiated, radio-frequency, electromagnetic field immunity test IEC 61000-4-4 - Electrical fast transient/burst immunity test IEC 61000-4-5 - Surge immunity test IEC 61000-4-6 - Immunity to conducted disturbances, induced by radio-frequency fields IEC 61000-4-11 - Voltage dips, short interruptions and voltage variations immunity tests

Power & control wiring

Wiring Diagram



Label



Characteristics and functions of power terminals

Terminal	Function	For xD1000
⏚	Ground terminal	All ratings
R/L1 - S/L2 - T/L3	Power input terminal	All ratings
PA/+	Brake resistor terminal (DC Bus + output)	XD1000-04P1-4B2111...XD1000-60P0-4B2111
PB	Brake resistor terminal	XD1000-04P1-4B2111...XD1000-60P0-4B2111
U/T1 - V/T2 - W/T3	Motor wiring terminal	All ratings

Arrangement of control terminals

R1A Normally open (NO) contact of the relay
R1B Normally closed (NC) contact of the relay
R1C Common pin of the relay
COM Common of analog and logic I/Os
AI1 Analog input / Logic Input Plus (LIU)
5V +5VDC supply provided by the drive
AO1 Analog Output

LO+ Logic Output (collector)
LO - Common of the logic Output (emitter)
LI1 Logic Input
LI2 Logic Input
LI3 Logic Input
LI4 Logic Input
+24V +24VDC supply provided by the drive
RJ45 Modbus serial port or Remote LED Operator

Peripheral Devices

Circuit Breaker (MPCB/MCCB) & Main contactor

CAT No.	Circuit Breaker						Main Contactor			
	MPCB		MCCB-DZ-Series		MCCB-DN-Series		MO		MNX	
	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating
	-	[A]	-	[A]	-	[A]	-	[A]	-	[A]
XD1000-01P5-4B1111	MOG-H1M	2.5	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD1000-02P3-4B1111	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD1000-04P1-4B2111	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD1000-05P5-4B2111	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD1000-08P9-4B2111	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 18	18	MNX 18	18
XD1000-12P1-4B2111	MOG-H1M	20	DZ1-160N	20	DN0-100M	32	MO 18	18	MNX 18	18
XD1000-16P0-4B2111	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 25	25	MNX 25	25
XD1000-22P8-4B2111	MOG-H1M	32	DZ1-160N	32	DN0-100M	32	MO 32	32	MNX 32	32
XD1000-30P0-4B2111	MOG-H2M	40	DZ1-160N	40	DN0-100M	40	MO 40	40	MNX 40	40
XD1000-36P0-4B2111	MOG-H2M	50	DZ1-160N	50	DN0-100M	50	MO 50	50	MNX 50	50
XD1000-43P0-4B2111	MOG-H2M	63	DZ1-160N	63	DN0-100M	63	MO 70	70	MNX 70	70
XD1000-60P0-4B2111			DZ1-160N	100	DN0-100M	80	MO 80	80	MNX 80	80

Input, Output Choke & Semi-conductor Fuses

CAT No.	Line (Input) Choke(2)	Motor (Output) Choke(4)	Semi-conductor Fuses	
	[mH] - [A]	[mH] - [A]	[A]	Type
XD1000-01P5-4B1111	9.982 mH - 3 A	9.317 mH - 2 A	4	gR
XD1000-02P3-4B1111	5.989 mH - 4 A	6.076 mH - 3 A	6	gR
XD1000-04P1-4B2111	3.225 mH - 7 A	3.409 mH - 5 A	13	gR
XD1000-05P5-4B2111	2.382 mH - 9 A	2.541 mH - 6 A	16	gR
XD1000-08P9-4B2111	1.477 mH - 15 A	1.571 mH - 10 A	20	gR
XD1000-12P1-4B2111	1.165 mH - 20 A	1.155 mH - 15 A	25	gR
XD1000-16P0-4B2111	0.912 mH - 25 A	0.874 mH - 20 A	40	gR
XD1000-22P8-4B2111	0.711 mH - 30 A	0.613 mH - 25 A	40	gR
XD1000-30P0-4B2111	0.544 mH - 40 A	0.466 mH - 35 A	63	gS
XD1000-36P0-4B2111	0.450 mH - 50 A	0.389 mH - 40 A	80	gS
XD1000-43P0-4B2111	0.388 mH - 60 A	0.325 mH - 50 A	100	gS
XD1000-60P0-4B2111	0.295 mH - 75 A	0.233 mH - 65 A	125	gS

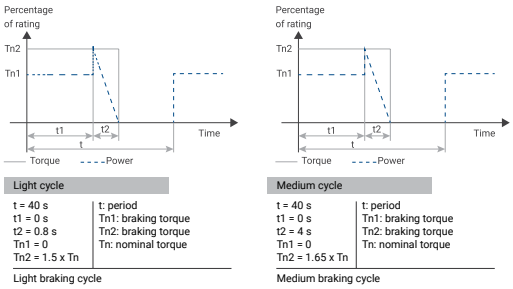
(2) - With line choke at 380 Vac supply voltage, considered 3% voltage drop in between the phases.
- Supply mains with significant disturbance from other equipment (interference, overvoltages)
- Supply mains with voltage imbalance between phases > 1.8% of nominal voltage
- Drive supplied by a supply mains with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- If line Isc is greater than the values in the table, add line chokes
- Installation of a large number of frequency inverters on the same supply mains

(4) Motor chokes are recommended;
- to limit the dv/dt at the motor terminals (500 to 1500 V/µs), for cables longer than 50 m/164.04 ft
- Reduce the motor ground leakage current
- Smooth the motor current wave form to reduce motor noise
- When VFD is connected to more than 2 motors in parallel
- When the motor cable length is higher than 25 m (shielded) or 50 m (unshielded)

Peripheral Devices

Braking Unit & Resistors

CAT No.	Braking Unit	DBR		
		Specification of Braking Resistor When ED is		Min. Resistance
		Light Braking Cycle	Medium Braking Cycle	
		2%(5)	10%(6)	
		[Ω] - [W]	[Ω] - [W]	[Ω]
XD1000-01P5-4B1111	Not Available	Not Applicable	Not Applicable	Not Applicable
XD1000-02P3-4B1111	Not Available	Not Applicable	Not Applicable	Not Applicable
XD1000-04P1-4B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	80
XD1000-05P5-4B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	60
XD1000-08P9-4B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	36
XD1000-12P1-4B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	36
XD1000-16P0-4B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	28
XD1000-22P8-4B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	28
XD1000-30P0-4B2111	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28
XD1000-36P0-4B2111	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	16
XD1000-43P0-4B2111	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	10
XD1000-60P0-4B2111	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	10



(5) Machines with low inertia
- Heavy Duty : 0.8 sec braking with 150% Braking Torque for 40 sec Cycle Time
- Normal Duty : 0.8 sec braking with 120% Braking Torque for 40 sec Cycle Time

(6) Machines with low inertia
- Heavy Duty : 4 sec braking with 165% Braking Torque for 40 sec Cycle Time
- Normal Duty : 4 sec braking with 135% Braking Torque for 40 sec Cycle Time

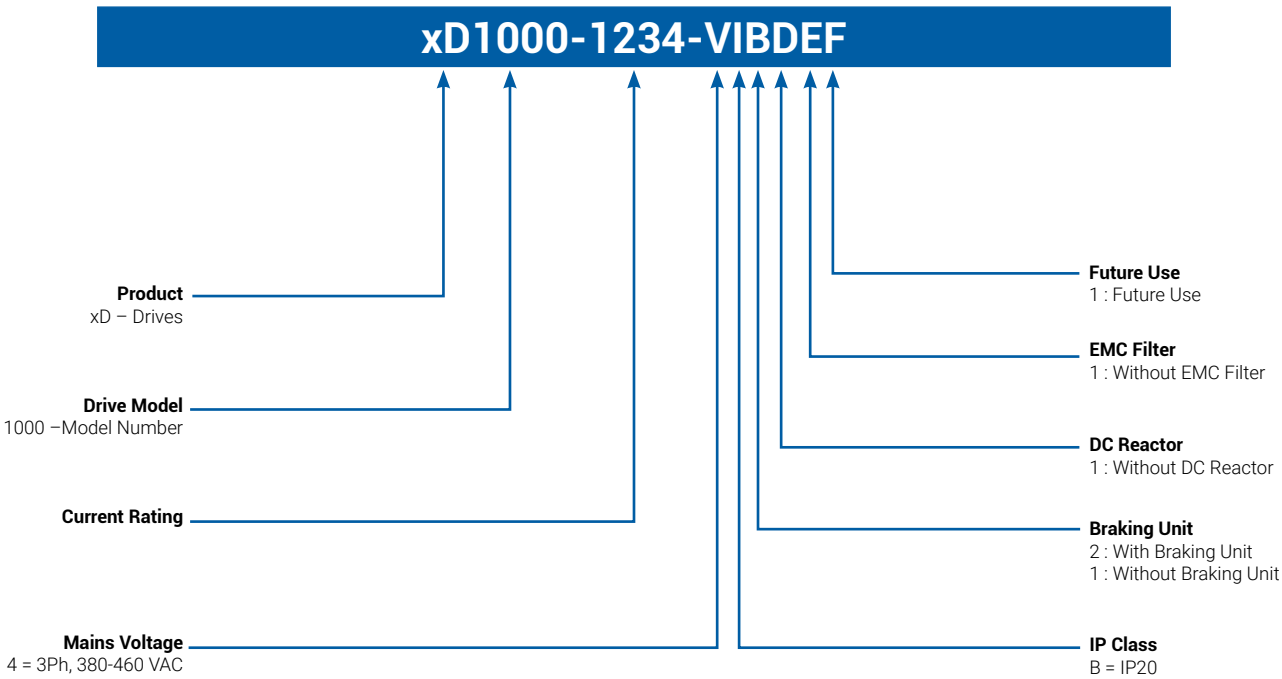
Accessories & Cable sizing

Accessories

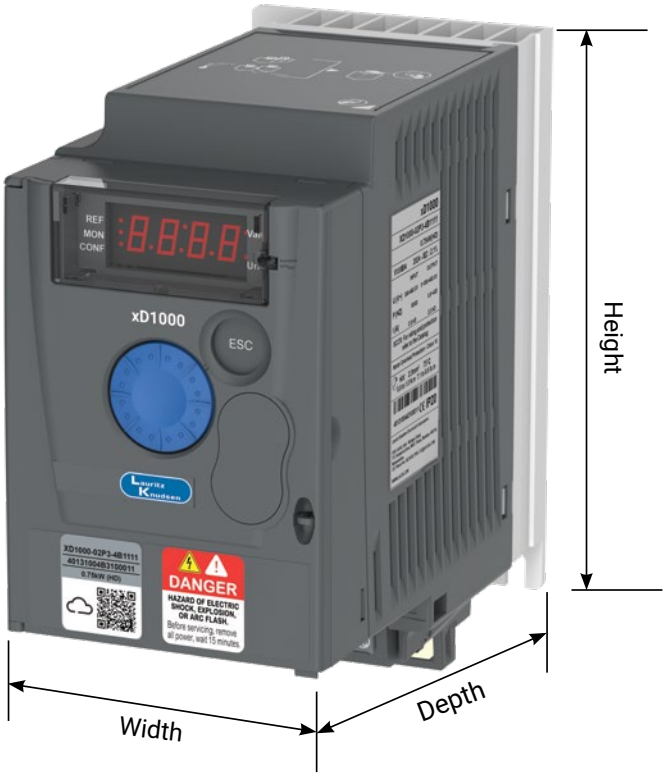
CAT No.	Description
XDOP-DOP-100	Remote LED Keypad

Cable Sizing

CAT No.	Cable Sizes	
	Supply (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)
	mm^2 (AWG)	mm^2 (AWG)
XD1000-01P5-4B1111	2.5 (14)	2.5 (14)
XD1000-02P3-4B1111	2.5 (14)	2.5 (14)
XD1000-04P1-4B2111	2.5 (14)	2.5 (14)
XD1000-05P5-4B2111	2.5 (14)	2.5 (14)
XD1000-08P9-4B2111	2.5 (14)	2.5 (14)
XD1000-12P1-4B2111	4 (12)	4 (12)
XD1000-16P0-4B2111	4 (12)	4 (12)
XD1000-22P8-4B2111	10 (7)	10 (7)
XD1000-30P0-4B2111	10 (7)	10 (7)
XD1000-36P0-4B2111	25(3)	16(4)
XD1000-43P0-4B2111	25(3)	16(4)
XD1000-60P0-4B2111	35(2)	25(3)



Product Dimensions



CAT No.	Width [mm]	Height [mm]	Depth [mm]	Weight [kg]	Frame Size
XD1000-01P5-4B1111	72.0	143.0	130.0	0.800	S1
XD1000-02P3-4B1111	72.0	143.0	140.0	0.800	
XD1000-04P1-4B2111	105.0	143.0	151.0	1.100	S2
XD1000-05P5-4B2111	105.0	143.0	151.0	1.100	
XD1000-08P9-4B2111	140.0	184.0	151.0	1.800	S3
XD1000-12P1-4B2111	140.0	184.0	151.0	1.800	
XD1000-16P0-4B2111	140.0	184.0	151.0	1.800	
XD1000-22P8-4B2111	150.0	232.0	171.0	3.700	S4
XD1000-30P0-4B2111	150.0	232.0	171.0	3.700	
XD1000-36P0-4B2111	180.0	330.0	191.0	6.300	S5
XD1000-43P0-4B2111	180.0	330.0	191.0	6.300	
XD1000-60P0-4B2111	180.0	390.0	212.0	8.500	S6

xD2000 Series

Range: 0.37kW HD ~ 160kW ND

The xD2000 Drive is a high-performance variable frequency drive designed to deliver exceptional control and efficiency for a variety of utility applications such as fan, pump, compressors and also other non-regenerative process applications not requiring braking. The xD2000 allows for seamless integration into automation systems, enhancing overall operational performance. Its robust design ensures reliability in demanding environments, while features like energy-saving modes help reduce operational costs. The user-friendly interface simplifies setup and adjustments, making the xD2000 an ideal choice for both new installations and upgrades.

Contents

xD2000

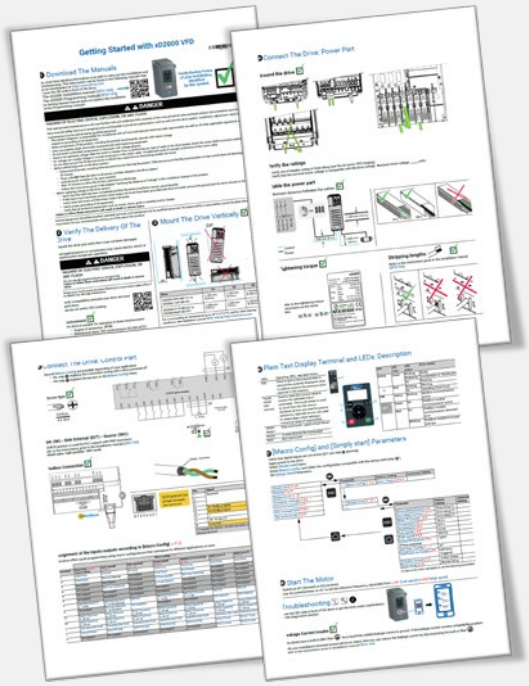
User benefits

Reliable & Robust

- Built-in DC Reactor right from 4kW ND till 160kW ND ensuring :
  - around 40% at rated load
  - around 48% at 80% load
  - Protection to capacitor bank and inverter circuit against voltage fluctuations
  - Reducing ripples in DC bus to allow drive to motor cable length up to 150~200 mtrs without output filter and up to 350 mtrs with dV/dt filter for motor complying to IEC60034-25
- Inbuilt EMC filter entire range :
  - Complies to Environment 2, category C3 as per IEC 61800-3 for CE marking
  - Improves drives immunity against external noise and allows a path to dissipate internal noise through ground
- Busbar plating to avoid chemical gas corrosion
- Robust galvanic isolation between control and power circuit

Easy to install & program

- Simple and crisp installation sheet in packing box
- Complete Parameter list for ease of reference
- Different coloured control IO terminals & clear tagging of power terminals avoids wrong connection



User benefits

Monitoring parameters

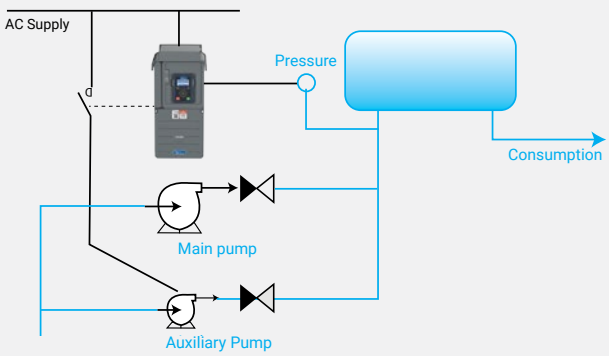
- Motor speed, current, voltage, torque, power
- Motor's thermal state
- Motor run time
- Energy monitors in Wh, kWh, MWh, GWh, TWh
- Separate monitors for frequency reference and motor frequency
- Input supply voltage (AC), DC Bus voltage (DC)
- No. of starts applied

External 24VDC connection in absence of 3Ph supply

- To keep VFD display / control circuitry ON
- To keep fieldbus communication live
- To monitor IO Status and control Digital Input & Digital Output

Pump & compressor specific features

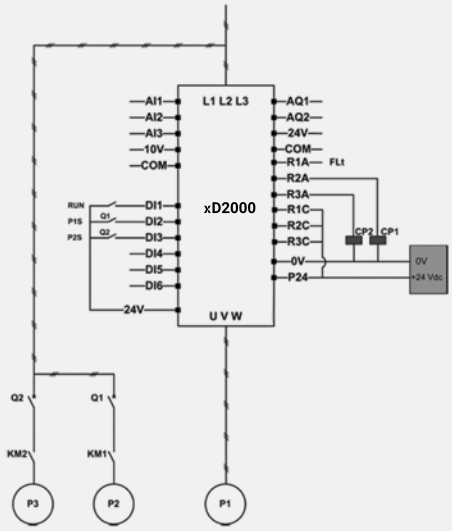
- Lead (Master), Auxiliary Pump selection with fixed and variable speed
- FIFO, FILO selection
- Booster pump with staging, destaging status
- PID wakeup and sleep with sleep boost
- Sleep mode can be activated based on
  - Output Frequency
  - Flow Sensor
  - Output Power
  - Digital Input
  - Multiple Conditions



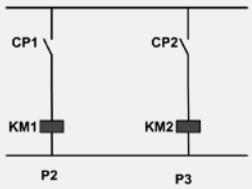
User benefits

Application specific functions

- Booster Pump Control – One Variable and Two Fixed Speed Pumps



Control Circuit



Wiring diagram

Pump 2 and pump 3 are controlled by relay outputs R2 and R3.

The state of each pump is provided to the drive via digital inputs DI2 and DI3:

- 1 = the pump is ready to operate.
- 0 = the pump is not available.

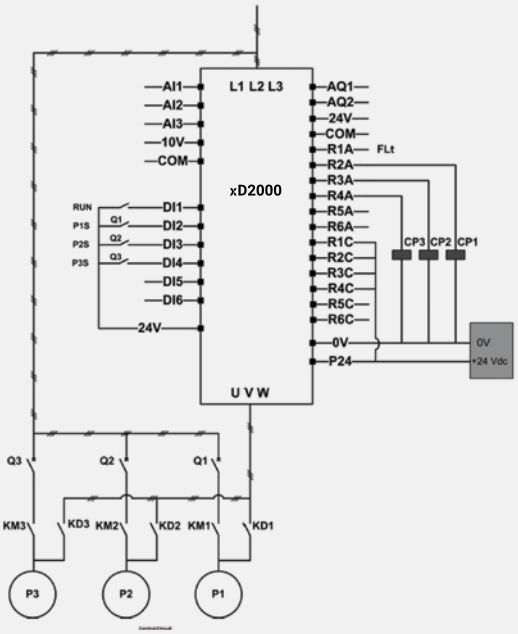
KM1 is switched ON when CP1 is activated. CP1 is controlled via the relay output R2.

KM2 is switched ON when CP2 is activated. CP2 is controlled via the relay output R3.

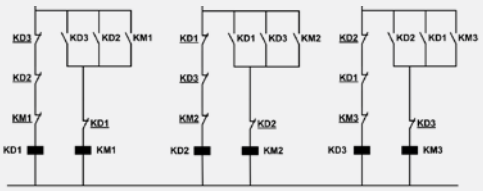
Q1 and Q2 must be switched ON to have both pump 2 and pump 3 ready to operate.

Application specific functions

- Booster Pump Control – Lead Pump Alternation on Three Pumps



Control Circuit



Wiring diagram

Each pump is controlled by a relay output:

- Pump 1 control via relay output R2.
- Pump 2 control via relay output R3.
- Pump 3 control via relay output R4.

The state of each pump is provided to the drive via digital inputs DI2, DI3, and DI4:

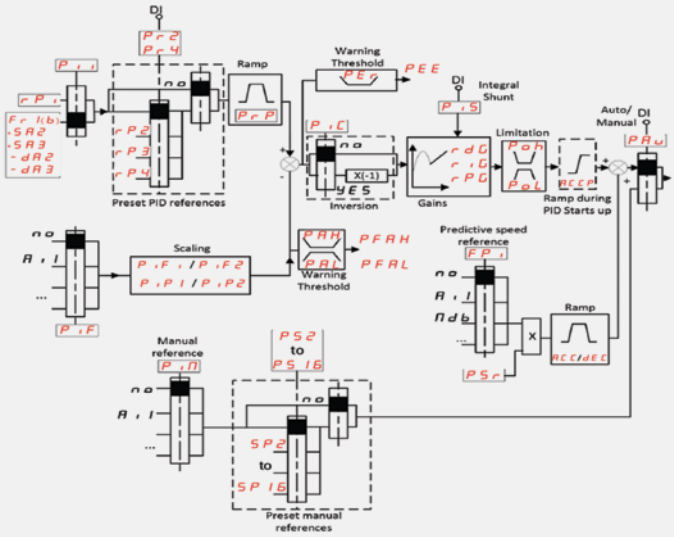
- 1 = the pump is ready to operate.
- 0 = the pump is not available.

If the relay output R2 is the first activated, the pump 1 becomes the lead pump. CP1 is switched ON via relay output R2, KD1 is switched ON and the pump 1 is connected to the drive.

User benefits

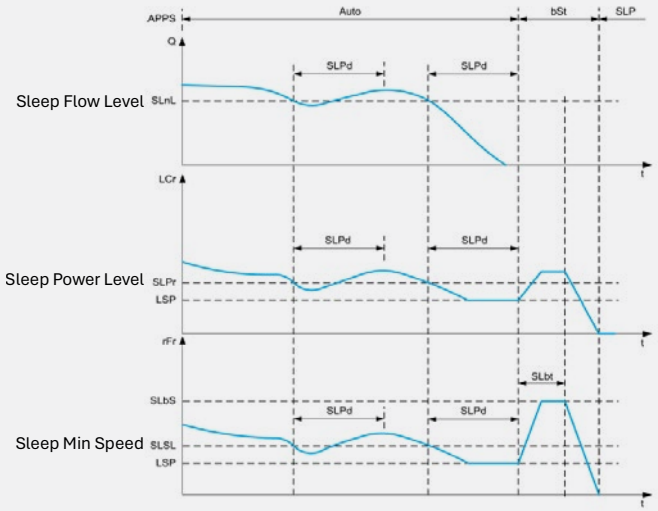
Application specific functions

- Built-in PID (AHU, Fan, Pump, Compressor) :
  - 4 preset PID reference using digital inputs
  - Wake up & sleep mode
  - Sleep Boost
  - PID predictive speed (Pre-PID frequency)



Application specific functions

- Wake up & sleep mode
- Sleep Boost

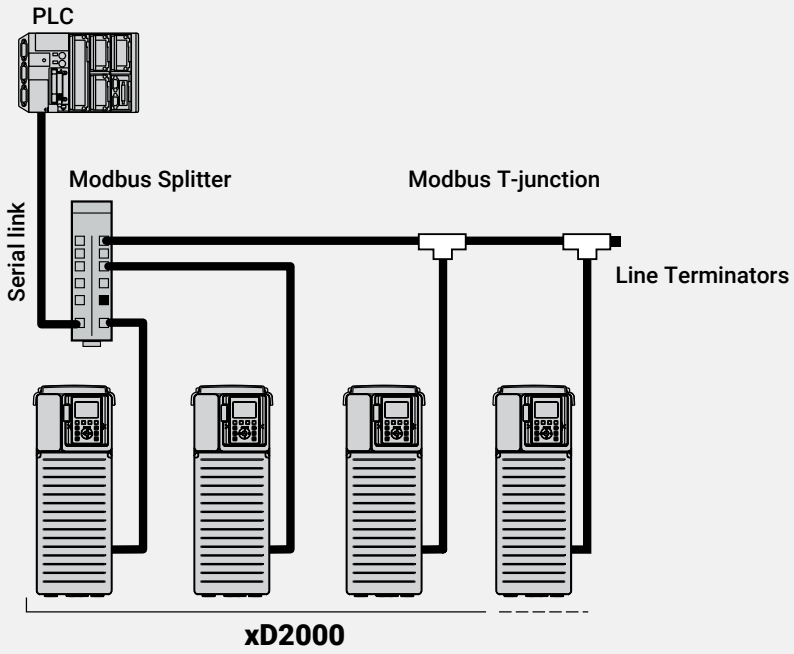


Application specific functions

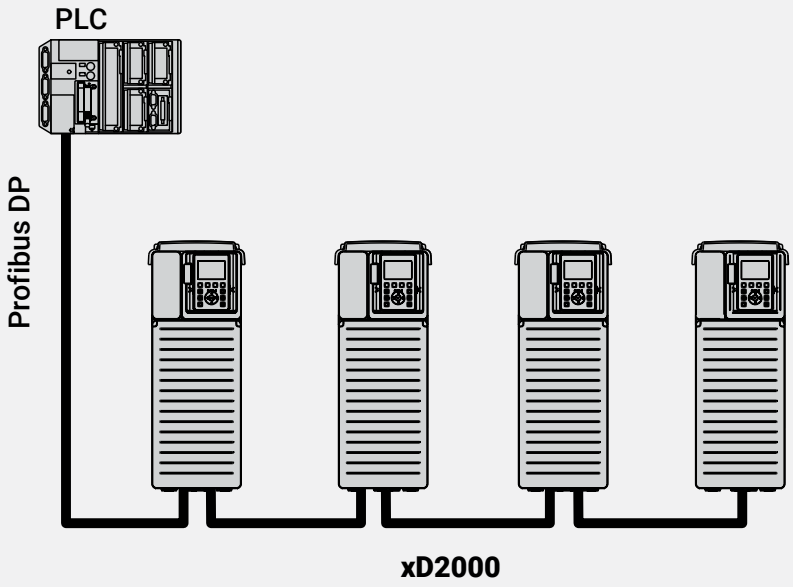
- Stall prevention :
  - Deceleration ramp time adaptation
  - Current limit during running
- Skip (jump) frequency
- Catch on the fly (speed search / flying start)
- DC braking (During Stopping)
- Cooling Fan Control
- Error detect disabling (Fire Mode)
- Control of Permanent Magnet Synchronous Motors (Open Loop – VT Applications)

Network Architecture

Modbus RTU Serial Link Protocol



Profibus DP Protocol



Current & Power Ratings

Input : 3-Phase, 380-460VAC (-15%, +10%), 50/60Hz (±5%)										
CAT No.	Rated Output[1]				Rated Input					
	P_{ND}	I_{ND}	P_{HD}	I_{HD}	Apparent Power at 460V		I_{ND} at 380V	I_{HD} at 380V	I_{ND} at 460V	I_{HD} at 460V
	(kW)	(A)	(kW)	(A)	kVA (ND)	kVA (HD)	(A)	(A)	(A)	(A)
XD2000-02P2-4B1121	0.75	2.2	0.37	1.5	2.1	1.1	3.10	1.70	2.60	1.40
XD2000-04P0-4B1121	1.5	4.0	0.75	2.2	3.8	2.1	5.70	3.10	4.80	2.60
XD2000-05P6-4B1121	2.2	5.6	1.5	4.0	5.2	3.7	7.80	5.60	6.50	4.60
XD2000-07P2-4B1121	3.0	7.2	2.2	5.6	6.7	5.1	10.10	7.60	8.40	6.40
XD2000-09P3-4B1221	4.0	9.3	3.0	7.2	6.3	4.9	8.8	7.2	7.9	6.20
XD2000-12P7-4B1221	5.5	12.7	4.0	9.3	8.4	6.3	11.6	8.9	10.5	7.9
XD2000-15P8-4B1221	7.5	15.8	5.5	12.7	10.2	8.1	14.7	11.3	12.8	10.2
XD2000-23P5-4B1221	11	23.5	7.5	16.5	15.6	11.6	22.0	16.4	19.6	14.6
XD2000-31P7-4B1221	15	31.7	11	23.5	20.7	16.6	29.4	23.0	26.0	20.8
XD2000-39P2-4B1221	18.5	39.2	15	31.7	26.7	22.6	37.2	31.6	33.5	28.3
XD2000-46P3-4B1221	22	46.3	18.5	39.2	28.8	25.2	41.9	36.0	36.2	31.6
XD2000-61P5-4B1221	30	61.5	22	46.3	44.5	33.8	62.5	49.7	55.8	42.5
XD2000-74P5-4B1221	37	74.5	30	59.6	54.4	45.2	76.6	65.8	68.3	56.8
XD2000-88P0-4B1221	45	88.0	37	74.5	65.9	55.4	92.9	80.5	82.7	69.6
XD2000-120P-4B1221	55	120.0	45	88.0	79.5	66.9	111.5	95.9	99.7	84.0
XD2000-145P-4B1221	75	145.0	55	106.0	103.7	81.0	147.9	115.8	130.2	101.7
XD2000-173P-4B1221	90	173.0	75	145.0	127.4	110.0	177.8	155.8	159.9	138.1
XD2000-211P-4B1221	110	211.0	90	173.0	140.0	118.8	201.0	170.0	175.7	149.1
XD2000-250P-4B1221	132	250.0	110	211.0	162.4	138.7	237.0	201.0	203.8	174.2
XD2000-302P-4B1221	160	302.0	132	250.0	198.8	164.0	284.0	237.0	249.5	205.9

Normal duty use	
I_{ND}	Continuous current with 110% overload for 60 secs.
P_{ND}	Maximum capacity in Normal Duty usage

Heavy duty use	
I_{HD}	Continuous current with 150% overload for 60 secs.
P_{HD}	Maximum capacity in Heavy Duty usage

Technical Specifications

Standard Specifications	
Range	0.37 – 132 kW (HD) / 0.75 – 160 kW (ND)
Enclosure type	IP20 without blanking plate on upper part IP4X for top with vent cover
Isolation type	Galvanic Isolation
Overloading Capacity	Heavy Duty : 150% of rated current for 1 min Normal Duty : 110% of rated current for 1 min
Max Output Voltage	Proportional to Input Voltage
Max Output Frequency	0.5 – 500 Hz
Rated Voltage	380 – 460 V (-15 – +10%)
Rated Frequency	50/60 Hz (± 5%)
Displacement Power Factor	≥ 0.98
True Power Factor*	≈ 0.89
Efficiency at full load	96.6 – 98.3%
%THDi	38 - 47%
Built-in Keypad	Detachable, Basic LCD Keypad (Connected to RJ45 port) - 4 lines - IP21 Protection - White backlight - Supported by 6 languages - Store and download configurations
Optional Keypad	Advance Graphical LCD Keypad (Connected to RJ45 port)
EMC Filter Category	Built-in EMC filter complying to IEC/EN 61800-3, C3 category in environment 1 or 2 Maximum length of shielded cable: 50 m

Control Details	
Control Method	V/F, V/F 5 point, Slip Compensation, V/F - Energy Saving & Quadratic V/F, Open Loop Synchronous Motor
V/F Patterns	Linear, S Ramp, U Ramp, Customized (S Curve)
Acceleration / Deceleration Time	0.0 s – 6000 s
Frequency Precision Setting	Display: 0.1 Hz Analog Input: 0.012/50 Hz
Output Frequency Resolution	0.1 Hz
Starting Torque	150% at 3 Hz in V/F
Braking Torque	Around 20% in average of the nominal motor torque at low speed without DBR

Protection	
Motor Protection	Motor overload, Overcurrent, Motor short-circuit, Ground short-circuit, Motor e-thermal Protection (Motor thermal monitor), 1 Ph Output phase loss, 3 Ph Output phase loss (No motor detection)
Drive Protection	Error in precharge circuit, DC bus ripple error / DC bus capacitor damaged, IGBT short circuit, Autotuning fault, Drive overheating, Overvoltage, Undervoltage, Input phase loss, Load short circuit, Field bus interruption, HMI communication, IGBT overheat
Process Protection	Motor Overspeed, Process overload, Process underload, PI feedback fault, AI 4-20 mA current loss

*below 4kW ratings with line choke

Technical Specifications

Interface		
Logic (Digital) Inputs	Number	6 Nos. (Sink / Source)
	Type	24 Vdc (30 Vdc Max), Input Impedance : 4.42 kΩ
	Logic	Negative logic (Sink) : ≥ 16 V (state 0), ≤ 10 V (state 1) Positive logic (source) : 0 ≤ 5 V (state 0), ≥ 11 V (state 1)
	Specifications	• Sampling Time : 2 ms + 0.5 ms maximum
Pulse Inputs	Number	2 Nos. (Uses DI5 & DI6)
	Specifications	• Pulse counter 0 to 30 kHz • Frequency range: 0 to 30 kHz • Comply with level 1 PLC, IEC 65A-68 standard • State 0 if < 0.6 Vdc, state 1 if > 2.5 Vdc • Cyclic ratio: 50% ±10% • Maximum input voltage 30 Vdc, < 10 mA • Sampling time: 5 ms + 1 ms maximum
Analog Inputs	Number	3 No. (0 – +10 Vdc / 0 – 20 mA)
	Type	Voltage : 0 – 10 V, impedance : 30 kΩ Current : 0 – 20 mA, impedance : 250 Ω AI2, AI3 can be configure to temperature probe or water level sensor
	Specifications	• Resolution: 12 bits • Precision: ±0.6% for a temperature variation of 60 °C • Linearity: ± 0.15% (of maximum value) • Sampling time: 5 ms + 1 ms maximum
Digital Outputs	Number	3 Nos. (Relay)
	Relay output	3 No. - R1 (Form C / Changeover Type), R2 & R3 (Form A)
	Capacity	Minimum switching capacity: 5 mA for 24 Vdc Maximum switching capacity: • on inductive load (cos φ ≥ 0.4 and L/R ≤ 7 ms): 2 A for 250 Vac and 30 Vdc • on resistive load (cos φ = 1 and L/R = 0): 3 A for 250 Vac and 30 Vdc Refresh time: 5 ms ± 0.5 ms
Analog Outputs	Number	2 No. (0 – 10 Vdc / 0 – 20 mA)
	Type	• Voltage : 0 – +10 V (maximum voltage +1%), impedance: 470 Ω • Current : 0 – 20 mA, impedance: 500 Ω
	Specifications	• Resolution: 10 bits • Precision: ±1% for a temperature variation of 60 °C • Linearity: ±0.2% (of maximum value) • Sampling time: 10 ms + 1 ms maximum

Technical Specifications

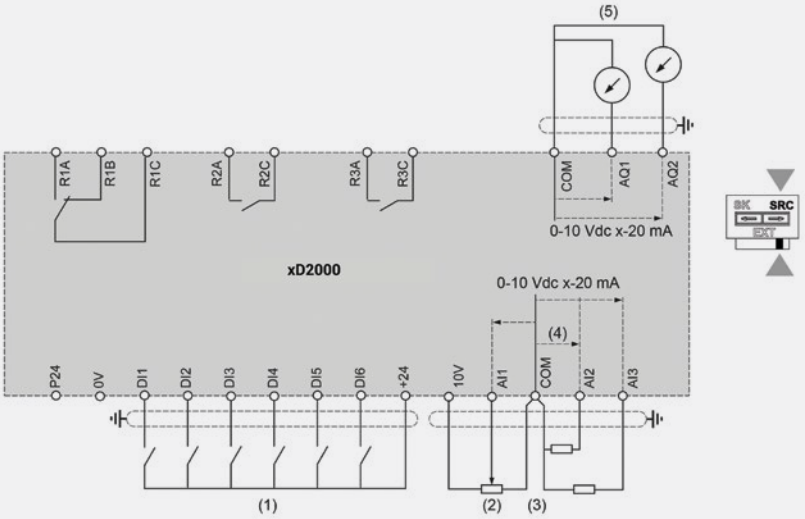
Environment	
Area of Use	Indoors. Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 2 Environment, conforming to IEC 61800-5-1)
Ambient temperature for operation	-15 – +45 °C (without derating) +45 – +60 °C (with derating factor)
Ambient temperature for storage	-40 – +70 °C
PCB Protection	Conformal coating class 3S3 for Dust and class 3C3 for Chemical pollution, complying to IEC 60721-3-3
Relative humidity	5 – 95% without condensation and without dripping water, conforming to IEC 60068-2-3
Altitude 0 to 1,000 m 1,001 to 4,800 m	 Without derating With derating of 1% per additional 100 m
Vibration Resistance	1.5 mm peak to peak (f= 2 to 13 Hz) conforming to IEC 60068-2-6 1 gn (f= 13 to 200 Hz) conforming to IEC 60068-2-6
Shock Resistance	6 gn for 11 ms conforming to IEC 60068-2-27
Type of cooling	Forced fan cooling structure

Communication	
Built-in Communication Protocol	Modbus
Connector Type	RJ45 (on front face) for Modbus
Physical Interface	2-wire RS 485 for Modbus
Transmission Frame	RTU for Modbus
Transmission Rate	4800 – 38400 bps for Modbus
Optional Communication Protocol	Profibus DP
Connector Type	Sub-D connector
Physical Interface	9-pin female for connection
Profile and Telegram Supported	Native drive profile (CiA®402) - 100,101,102,106,107 PROFIdrive - 1
Transmission Rate	9.6 – 12000 kbps (Automatic detection of the bus speed)
Additional Features	• Supports standard identification & maintenance requests • Supports diagnostic data with VSD status (Variable speed drive status) • Several DP V1 messaging modes • Host drive can be handled from two masters (MS0 and MS1) • Quick setup from drive side

Compliance	
Compliance with standards	CE, RoHS
Applicable Standard	IEC 61800-3 IEC 61800-5-1 IEC 60721-3
Electromagnetic Compatibility	IEC 61000-4-2 - Electrostatic discharge immunity test IEC 61000-4-3 - Radiated, radio-frequency, electromagnetic field immunity test IEC 61000-4-4 - Electrical fast transient/burst immunity test IEC 61000-4-5 - Surge immunity test IEC 61000-4-6 - Immunity to conducted disturbances, induced by radio-frequency fields

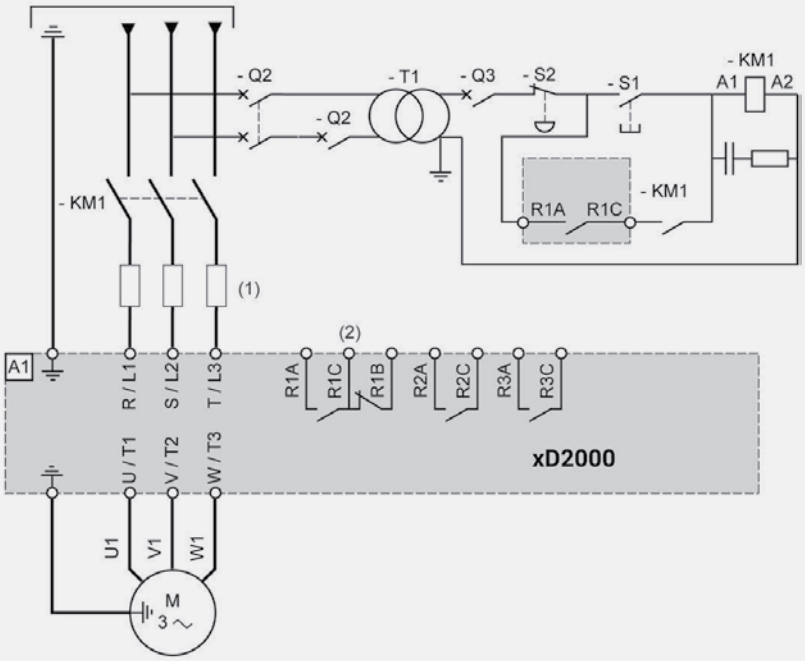
Power & control wiring

Control Wiring Diagram



(1) Digital Inputs
(2) Reference potentiometer
(3) Analog inputs
(4) -10...10 Vdc
(5) Analog outputs

Power Wiring



(1) Line choke (if used).
(2) Use relay output R1 set to operating state Fault to switch Off the product once an error is detected.

Peripheral Devices

Circuit Breaker (MCCB/MPCB) & Main Contactor

CAT No.	Circuit Breaker						Main Contactor			
	MPCB		MCCB-DZ Series		MCCB-DN Series		MO		MNX	
	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating
	-	[A]	-	[A]	-	[A]	-	[A]	-	[A]
XD2000-02P2-4B1121	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD2000-04P0-4B1121	MOG-H1M	6.3	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD2000-05P6-4B1121	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD2000-07P2-4B1121	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 25	25	MNX 25	25
XD2000-09P3-4B1221	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 25	25	MNX 25	25
XD2000-12P7-4B1221	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 25	25	MNX 25	25
XD2000-15P8-4B1221	MOG-H1M	20	DZ1-160N	20	DN0-100M	32	MO 32	32	MNX 32	32
XD2000-23P5-4B1221	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 32	32	MNX 32	32
XD2000-31P7-4B1221	MOG-H1M	32	DZ1-160N	32	DN0-100M	32	MO 40	40	MNX 40	40
XD2000-39P2-4B1221	MOG-H2M	40	DZ1-160N	40	DN0-100M	40	MO 50	50	MNX 50	50
XD2000-46P3-4B1221	MOG-H2M	50	DZ1-160N	50	DN0-100M	50	MO 50	50	MNX 50	50
XD2000-61P5-4B1221	MOG-H2M	63	DZ1-160N	63	DN0-100M	63	MO 80	80	MNX 80	80
XD2000-74P5-4B1221			DZ1-160N	80	DN0-100M	80	MO 80	80	MNX 80	80
XD2000-88P0-4B1221			DZ1-160N	125	DN1-160M	125	MO 140	140	MNX 140	140
XD2000-120P-4B1221			DZ1-160N	160	DN1-160M	160	MO 140	140	MNX 140	140
XD2000-145P-4B1221			DZ1-160N	160	DN1-160M	160	MO 185	185	MNX 185	185
XD2000-173P-4B1221			Available on Req	*	DN2-250M	250	MO 185	185	MNX 185	185
XD2000-211P-4B1221			Available on Req	*	DN2-250M	250	MO 185	185	MNX 185	185
XD2000-250P-4B1221			Available on Req	*	DN3-400M	320	MO 300	300	MNX 300	300
XD2000-302P-4B1221			Available on Req	*	DN3-400M	400	MO 300	300	MNX 300	300

Input & Output Choke

CAT No.	Line (Input) Choke(2)	Semi-conductor fuses		DC Choke	Motor (Output) Choke(4)
	[mH] - [A]	[A]	Type		[mH] - [A]
XD2000-02P2-4B1121	6.762 mH - 4 A	8	gR	Not Available	6.352 mH - 3 A
XD2000-04P0-4B1121	3.678 mH - 6 A	10	gR	Not Available	3.494 mH - 5 A
XD2000-05P6-4B1121	2.688 mH - 8 A	12	gR	Not Available	2.496 mH - 6 A
XD2000-07P2-4B1121	2.076 mH - 15 A	20	gR	Not Available	1.941 mH - 8 A
XD2000-09P3-4B1221	2.382 mH - 9 A	16	gR	Built-in	1.503 mH - 10 A
XD2000-12P7-4B1221	1.807 mH - 15 A	20	gR	Built-in	1.101 mH - 15 A
XD2000-15P8-4B1221	1.426 mH - 15 A	25	gR	Built-in	0.885 mH - 20 A
XD2000-23P5-4B1221	0.953 mH - 25 A	40	gR	Built-in	0.595 mH - 25 A
XD2000-31P7-4B1221	0.713 mH - 30 A	50	gR	Built-in	0.441 mH - 35 A
XD2000-39P2-4B1221	0.564 mH - 40 A	63	gR	Built-in	0.357 mH - 45 A
XD2000-46P3-4B1221	0.501 mH - 45 A	80	gR	Built-in	0.302 mH - 50 A
XD2000-61P5-4B1221	0.336 mH - 65 A	100	gR	Built-in	0.228 mH - 65 A
XD2000-74P5-4B1221	0.274 mH - 80 A	125	gR	Built-in	0.188 mH - 80 A
XD2000-88P0-4B1221	0.226 mH - 95 A	160	gR	Built-in	0.159 mH - 95 A
XD2000-120P-4B1221	0.188 mH - 115 A	160	gR	Built-in	0.117 mH - 130 A
XD2000-145P-4B1221	0.142 mH - 150 A	250	gR	Built-in	0.097 mH - 155 A

Peripheral Devices

Input & Output Choke

CAT No.	Line (Input) Choke [2]	Semi-conductor fuses		DC Choke	Motor (Output) Choke[4]
	[mH] - [A]	[A]	Type		[mH] - [A]
XD2000-173P-4B1221	0.118 mH - 180 A	250	gR	Built-in	0.081 mH - 185 A
XD2000-211P-4B1221	0.105 mH - 205 A	315	aR	Built-in	0.067 mH - 225 A
XD2000-250P-4B1221	0.089 mH - 240 A	350	aR	Built-in	0.056 mH - 265 A
XD2000-302P-4B1221	0.074 mH - 285 A	400	aR	Built-in	0.047 mH - 320 A

(2)
- With line choke at 380 Vac supply voltage, considered 3% voltage drop in between the phases.
- Supply mains with significant disturbance from other equipment (interference, overvoltages)
- Supply mains with voltage imbalance between phases > 1.8% of nominal voltage
- Drive supplied by a supply mains with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- If line Isc is greater than the values in the table, add line chokes
- Installation of a large number of frequency inverters on the same supply mains

(4)
Motor chokes are recommended;
- to limit the dv/dt at the motor terminals (500 to 1500 V/µs), for cables longer than 50 m/164.04 ft
- Reduce the motor ground leakage current
- Smooth the motor current wave form to reduce motor noise
- When VFD is connected to more than 2 motors in parallel
- When the motor cable length is higher than 25 m (shielded) or 50 m (unshielded)

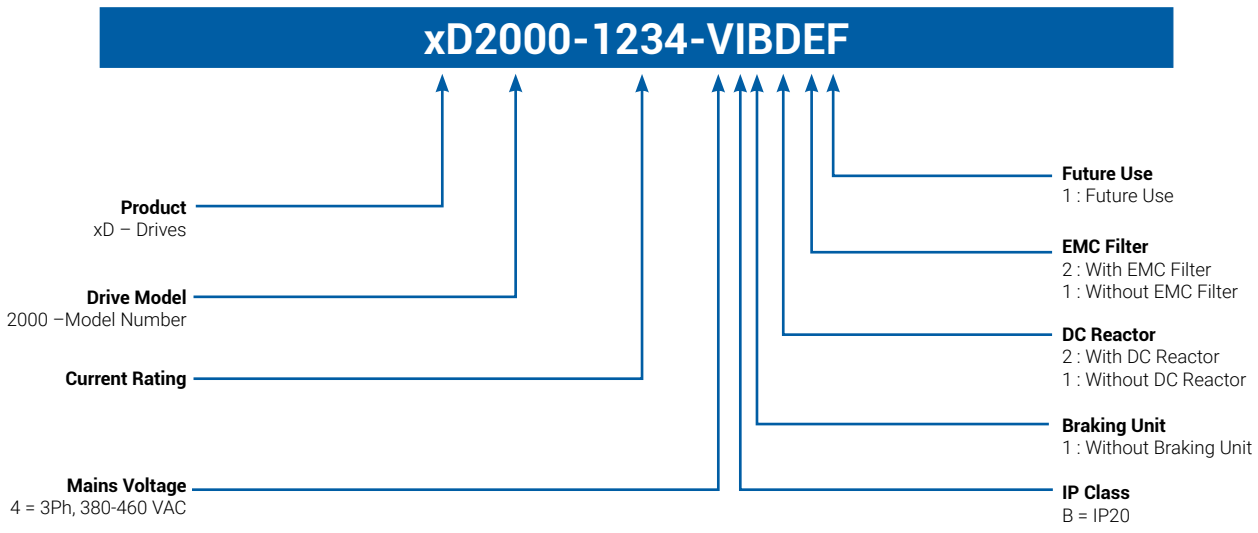
Accessories & Cable sizing

Accessories

CAT No.	Description
XDOP-DOP-300	IP21 LCD Std. Graphical Keypad
XDKT-DOP-300	Remote Mounting Kit for IP21 LCD Keypad
XDOP-DOP-500	IP65 LCD Graphical Keypad
XDKT-DOP-500	Mounting kit for IP65 LCD Keypad
XDIO-EX1-V01	IO Expansion Card-1 - 6DI,2DO,2AI
XDIO-EX2-V01	IO Expansion Card-2 - 3RO
XDCI-PDP-V01	Profibus-DP Comm. Card

Cable sizing

CAT No.	Cable Sizes	
	Supply (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)
	mm^2 (AWG)	mm^2 (AWG)
XD2000-02P2-4B1121	1.5 (16)	1.5 (16)
XD2000-04P0-4B1121	1.5 (16)	1.5 (16)
XD2000-05P6-4B1121	1.5 (16)	1.5 (16)
XD2000-07P2-4B1121	1.5 (16)	1.5 (16)
XD2000-09P3-4B1221	1.5 (16)	1.5 (16)
XD2000-12P7-4B1221	1.5 (16)	1.5 (16)
XD2000-15P8-4B1221	2.5 (14)	2.5 (14)
XD2000-23P5-4B1221	4 (12)	4 (12)
XD2000-31P7-4B1221	6 (10)	6 (10)
XD2000-39P2-4B1221	10 (8)	10 (8)
XD2000-46P3-4B1221	10 (8)	10 (8)
XD2000-61P5-4B1221	16 (6)	16 (6)
XD2000-74P5-4B1221	25 (4)	25 (4)
XD2000-88P0-4B1221	35 (2)	35 (2)
XD2000-120P-4B1221	50 (1/0)	50 (1/0)
XD2000-145P-4B1221	70 (2/0)	70 (2/0)
XD2000-173P-4B1221	95 (3/0)	95 (3/0)
XD2000-211P-4B1221	2 x 50 (2 x 1/0)	2 x 50 (2 x 1/0)
XD2000-250P-4B1221	2 x 70 (2 x 2/0)	2 x 70 (2 x 2/0)
XD2000-302P-4B1221	2 x 95 (2 x 3/0)	2 x 95 (2 x 3/0)



Product Dimensions

CAT No.	Width	Height	Depth	Weight	Frame Size
	[mm]	[mm]	[mm]	[kg]	
XD2000-02P2-4B1121	145.0	297.0	203.0	3.135	S1
XD2000-04P0-4B1121	145.0	297.0	203.0	3.135	
XD2000-05P6-4B1121	145.0	297.0	203.0	3.135	
XD2000-07P2-4B1121	145.0	297.0	203.0	3.135	
XD2000-09P3-4B1221	145.0	297.0	203.0	4.045	
XD2000-12P7-4B1221	145.0	297.0	203.0	4.575	
XD2000-15P8-4B1221	145.0	297.0	203.0	4.575	
XD2000-23P5-4B1221	171.0	360.0	233.0	7.730	S2
XD2000-31P7-4B1221	171.0	360.0	233.0	7.730	
XD2000-39P2-4B1221	211.0	495.0	232.0	13.500	S3
XD2000-46P3-4B1221	211.0	495.0	232.0	13.500	
XD2000-61P5-4B1221	226.0	613.0	271.0	25.500	S4
XD2000-74P5-4B1221	226.0	613.0	271.0	25.500	
XD2000-88P0-4B1221	226.0	613.0	271.0	25.500	
XD2000-120P-4B1221	290.0	762.0	323.0	53.000	S5
XD2000-145P-4B1221	290.0	762.0	323.0	53.000	
XD2000-173P-4B1221	290.0	762.0	323.0	53.000	
XD2000-211P-4B1221	300.0	850.0	375.0	85.500	S6
XD2000-250P-4B1221	300.0	850.0	375.0	85.500	
XD2000-302P-4B1221	300.0	850.0	375.0	85.500	

xD3000 Series

Range: 0.18kW HD ~ 15kW HD

The xD3000 Drive is a versatile and high-performance variable frequency drive designed for a wide range of OEM applications. With its compact design and robust features, the xD3000 offers seamless integration into various industrial environments. It supports advanced motor control algorithms and includes built-in connectivity options, allowing for easy integration with automation systems. While, xD3000 is engineered for energy efficiency, safety of machines, it also help businesses to reduce operational costs & maintaining optimal performance. Its user-friendly interface ensures quick setup and ease of use, making it an excellent choice for both new installations and retrofits.

Contents

xD3000

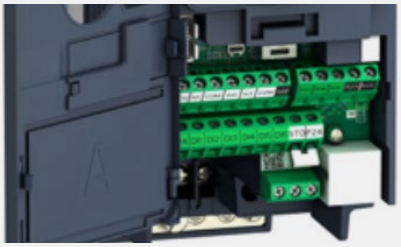
User benefits

Reliable & Rugged

- Built-in EMC filter entire range :
  - compliance with standard IEC/EN 61800-3, category C2 or C3 in environment 1 or 2
  - Complies to category C1 with external EMC filter
  - Improves drives immunity against external noise and allows a path to dissipate internal noise through ground

External 24VDC connection in absence of 3Ph supply

- To keep VFD display / control circuitry ON
- To keep fieldbus communication live
- To monitor IO Status and control Digital Input & Digital Output



Versatile operation

- Enhanced Speed & Torque accuracy at very low speed with Sensorless VVC
- High frequency range up to 599Hz for high-speed motors
- Control of asynchronous and permanent magnet motors
- Complete integration into any system architecture
  - Built-in : Modbus RTU, CANopen
  - Options: Modbus TCP, Ethernet IP, DeviceNet, PROFIBUS, PROFINET, etc.
- Motor surge limit function for Old, Poor quality, Rewound Motors

User benefits

General purpose functions

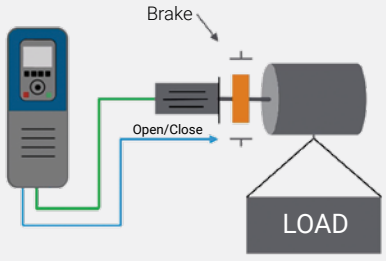
- In Built PID
- 4 preset PID reference using digital inputs
- Sleep/Wake-Up in Speed Control Mode
- PID Predictive Speed
- Catch on the fly (Flying Start)
- Fault Inhibition (Fire Mode)
- Auto Tuning
- Current Limitation (Stall Prevention)
- DC Braking / Stop
- Freewheel Stop & Fast Stop
- IGBT Test - after RUN command
  - Drive output short-circuit
  - IGBT inoperable
  - IGBT short-circuited

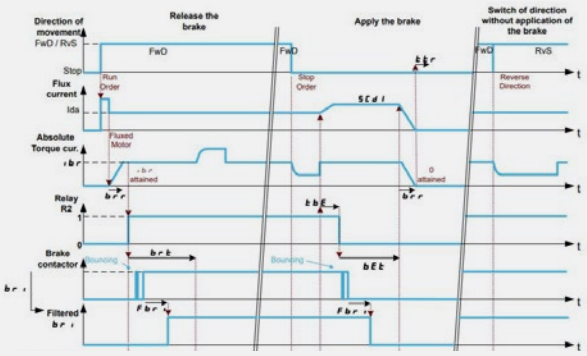
Application-Oriented Features

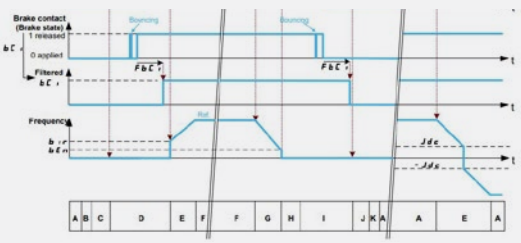
- Parameter set switching (15 Nos - 3 Sets)
- High speed switching
- DC sharing
- 5 Built-In safety functions: STO, SLS, SS1, SMS, GDL with additional option card
- Optimized energy saving
- Multi-motor / Multi-configuration control
- Kinetic Energy Buffering (KEB) or maintain the DC bus voltage

Brake control adapted for Horizontal & Vertical movement

- It provides external brake control function for
  Vertical load such as Crane/Hoist and Horizontal movement such as Long Travel & Cross Travel
- User can set separate set for Brake Release & Brake Engage
  - Brake Release : Current, Time, Frequency
  - Brake Engage : Frequency, Delay, Time
  - Additional Interlock : Brake Feedback, Brake Contactor Feedback, Brake Restart Sequence, load slip monitoring (Closed Loop)
- Separate brake release current for Hoisting and Lowering (Forward & Reverse)



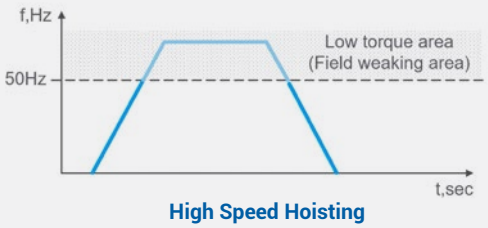




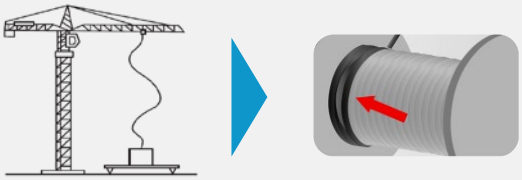
User benefits

High speed hoisting and Rope Slack

- **High Speed Hoisting**
  - This function allows adaption of the motor speed according to the load
  - In case of Hoisting. If the load is lower than the nominal load, it is possible to increase hoisting speed, even higher than nominal motor speed.
  - For example, increase speed of EMPTY crane hook while lower & raise
- **Rope Slack**
  - This function allows to prevent starting up at high speed when load has been set down to ground and the rope is still slack.
  - This function manages the movement in order to:
    - Avoid uneven winding of the cable on the drum
    - Prevent rope **break** and stress on jib crane when the cable is suddenly tight



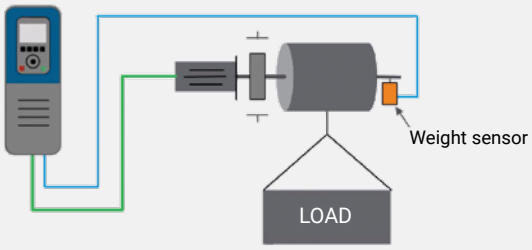
High Speed Hoisting



Rope Slack

External Load measurement using weight sensor

- This function uses the information supplied by a weight sensor to adapt the Brake Release Current.
- If the weight is significant, the drive automatically increases the brake release current, if weight is less then, brake release current decreases.
- This will be useful to reduce jerk during the start of work if we applied high brake release current to small load.



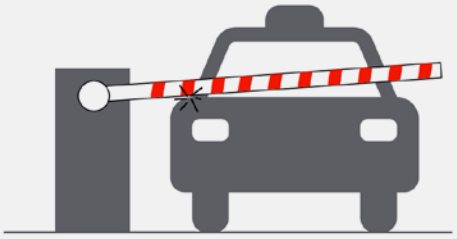
User benefits

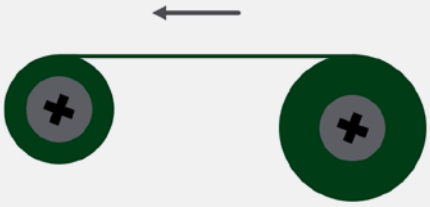
Torque limitation

- **Torque Limitation**
  This function allows to limit motor torque.

  For example, VFD is used to control gate barrier.
  In this case we can limit the torque, so even barrier is lowered onto the car, it stops and will not push with all his strength. This will keep the barrier & car intact.

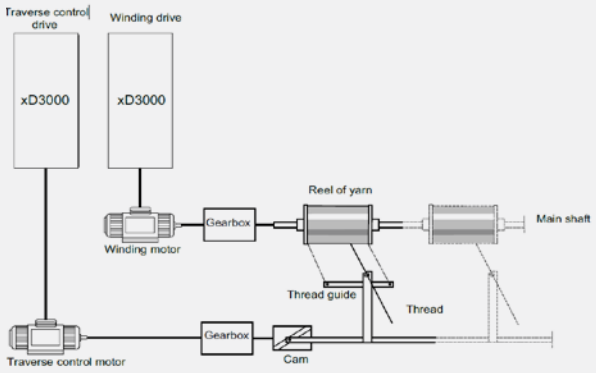
  Another example, VFD is used for winding-unwinding applications, where the diameter of the drum changes while in operation. If the diameter increase, the speed should decrease.



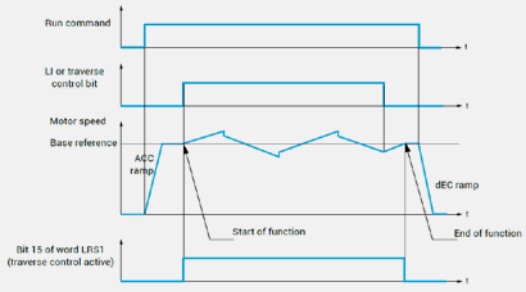


Traverse control

- This function allows the precise back-and-forth movement of a yarn guide on a winding machine, ensuring that the yarn is evenly distributed across the width of the bobbin or spool during the winding process.



Machine

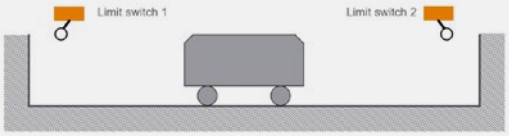


Timing Diagram

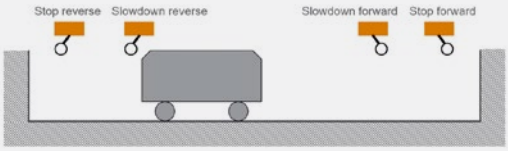
User benefits

Positioning by Limit Switches or Sensors

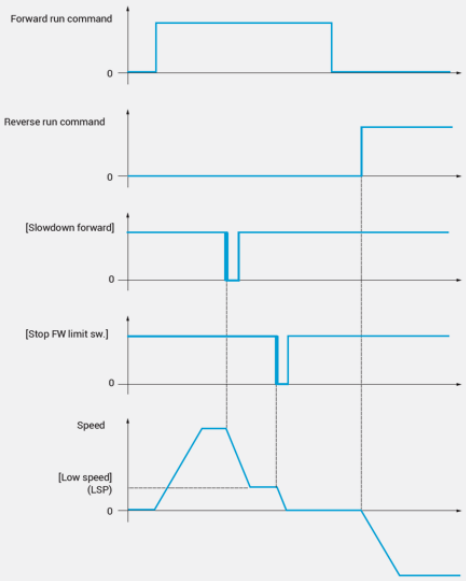
- This function is used for managing positioning using position sensors or limit switches linked to digital inputs.
- We can configure two types of command – Stopping and Slowing Down
- Stop mode of the VFD is configurable.
- When the stop contact is activated then only movement in other direction is authorised.



Limit switch management

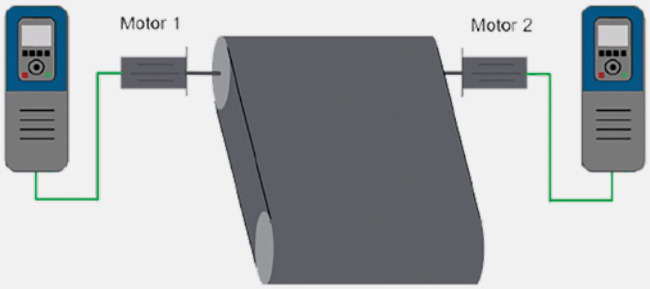


Positioning with Limit switches



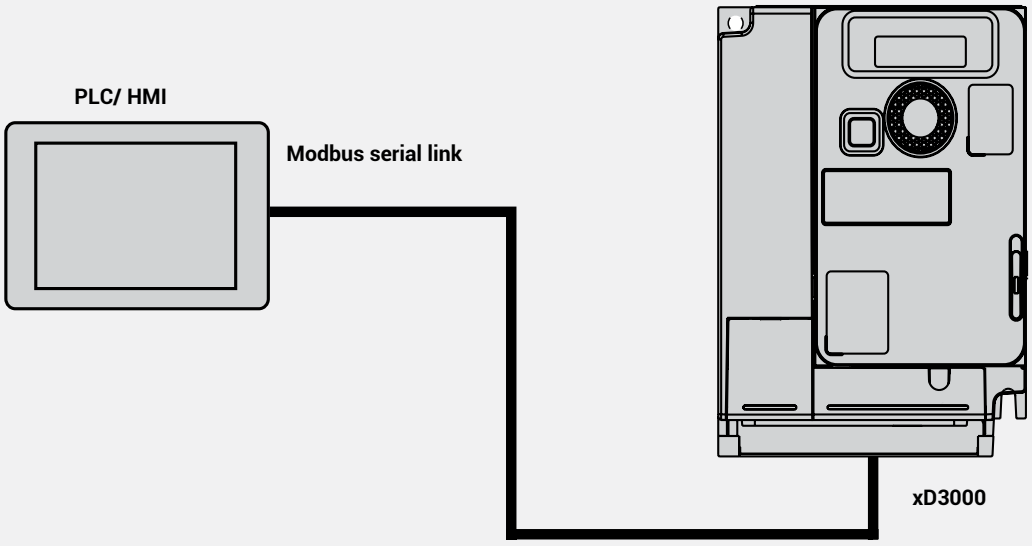
Load sharing

- When 2 motors are connected mechanically and therefore at the same speed, and each is controlled by a drive,this function can be used to improve torque distribution between the two motors
- Consider a system where two motors are mechanically linked. If Motor-1 is loaded more than Motor-2, it will slowdown Motor-1 & load on Motor-2 will increase.
  (Example : DRI Kiln, tandem Crane, Radar, long conveyor belt etc)

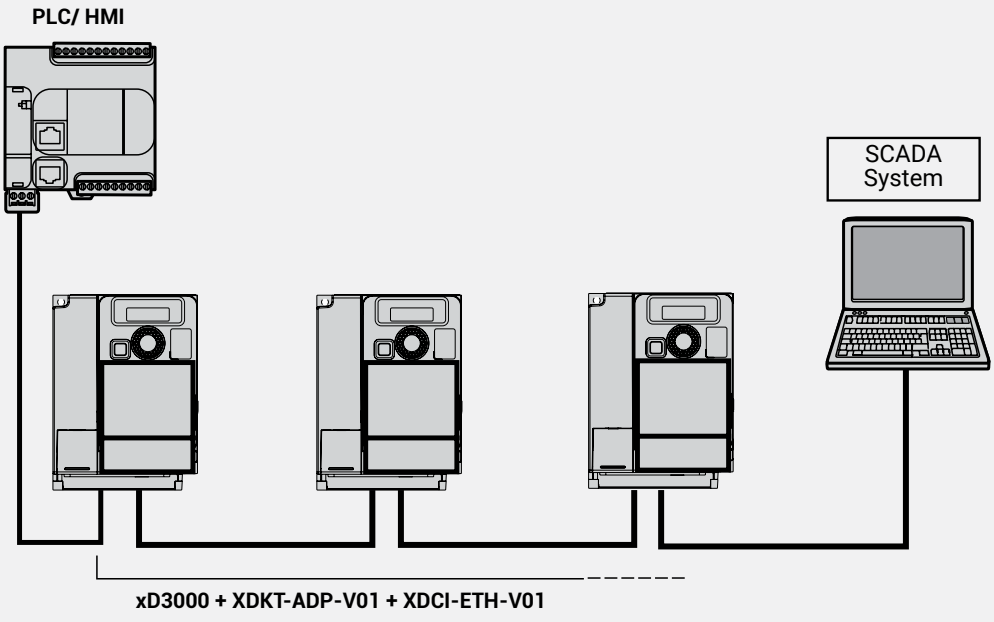


Network Architecture

Modbus RTU Serial Link Protocol



Modbus TCP and EtherNet/IP Daisy Chain Network



Current & Power Ratings

CAT No.	Rated Output[1]		Rated Input		
	P_{HD}	I_{HD}	Apparent Power at Vmax	I_{HD} at Vmin	I_{HD} at Vmax
	(kW)	(A)	kVA (HD)	(A)	(A)
Input : 1-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-1B2121	0.18	1.5	0.7	3.4	2.8
XD3000-03P3-1B2121	0.37	3.3	1.2	5.9	4.9
XD3000-03P7-1B2121	0.55	3.7	1.6	7.8	6.6
XD3000-04P8-1B2121	0.75	4.8	2.0	10	8.4
XD3000-06P9-1B2121	1.1	6.9	2.8	13.7	11.5
XD3000-08P0-1B2121	1.5	8.0	3.6	17.8	14.9
XD3000-11P0-1B2121	2.2	11	4.8	24	20.2
Input : 3-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-2B2111	0.18	1.5	0.7	2.0	1.7
XD3000-03P3-2B2111	0.37	3.3	1.2	3.6	3.0
XD3000-03P7-2B2111	0.55	3.7	1.7	4.9	4.2
XD3000-04P8-2B2111	0.75	4.8	2.2	6.3	5.3
XD3000-06P9-2B2111	1.1	6.9	3.0	8.6	7.2
XD3000-08P0-2B2111	1.5	8.0	3.9	11.1	9.3
XD3000-11P0-2B2111	2.2	11	5.2	14.9	12.5
XD3000-13P7-2B2111	3.0	13.7	6.5	18.7	15.7
XD3000-17P5-2B2111	4.0	17.5	8.3	23.8	19.9
XD3000-27P5-2B2111	5.5	27.5	12.4	35.4	29.8
XD3000-33P0-2B2111	7.5	33	15.9	45.3	38.2
XD3000-54P0-2B2111	11	54	21.4	60.9	51.4
XD3000-66P0-2B2111	15	66	27.9	79.7	67.1
Input : 3-Phase, 380 – 500 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-4B2121	0.37	1.5	1.4	2.1	1.6
XD3000-01P9-4B2121	0.55	1.9	1.9	2.8	2.2
XD3000-02P3-4B2121	0.75	2.3	2.4	3.6	2.8
XD3000-03P0-4B2121	1.1	3.0	3.3	5.0	3.8
XD3000-04P1-4B2121	1.5	4.1	4.2	6.4	4.9
XD3000-05P5-4B2121	2.2	5.5	5.7	8.7	6.6
XD3000-07P1-4B2121	3.0	7.1	7.3	11.1	8.4
XD3000-09P5-4B2121	4.0	9.5	9.2	13.7	10.6
XD3000-14P3-4B2121	5.5	14.3	12.6	20.7	14.5
XD3000-17P0-4B2121	7.5	17	16.2	26.5	18.7
XD3000-27P7-4B2121	11	27.7	22.2	36.6	25.6
XD3000-33P0-4B2121	15	33	28.8	47.3	33.3

Heavy duty use	
I_{HD}	Continuous current with 150% overload for 60 secs.
P_{HD}	Maximum capacity in Heavy Duty usage

(1)

- These values are given for continuous operation at nominal switching frequency of 4 kHz.
- For continuous operation above the nominal switching frequency, derate the nominal drive current (see the derating curves in the Installation Manual).
- For all ratings the switching frequency can be set between 2 and 16 kHz.

Technical Specifications

Standard Specifications	
Range	0.18 – 15.0 kW (HD)
Enclosure type	IP20
Isolation type	Galvanic Isolation
Overloading Capacity	Heavy Duty : 150% of rated current for 1 min
Max Output Voltage	Proportional to Input Voltage
Max Output Frequency	0.5 – 599 Hz
Rated Voltage	200 – 240 V (-15 – +10%) / 380 – 500 V (-15 – +10%)
Rated Frequency	50/60 Hz (± 5%)
Displacement Power Factor (With Line Choke)	≥ 0.95
True Power Factor (With Line Choke)	1Ph VFD ≈ 0.73, 3Ph VFD ≈ 0.89
Efficiency at full load	95.7 - 98.4%
%THDi at Rated Load(With Line Choke)	33 - 45.7%
Built-In Keypad	4 digit, 7 segment LED
Optional Keypad	• 4 digit, 7 segment LED, IP54 • Advance Graphical LCD Keypad (Connected to RJ45 port)
EMC Filter Category	• Built-in EMC filter compliance with standard IEC/EN 61800-3, category C2 or C3 in environment 1 or 2 • External EMC filter is mandatory required to fulfill the IEC/EN 61800-3 C1 category

Control Details	
Control Method	• Asynchronous Motor: V/F - 2 points & 5 Points, Slip Compensation, V/F - Energy Saving & Quadratic V/F, Sensorless Vector Control (SVC) • Synchronous Motor: Permanent magnet control law
V/F Patterns	Linear, S Ramp, U Ramp, Customized (S Curve)
Acceleration / Deceleration Time	0.0 s – 6000 s
Nominal Switching Frequency	4 kHz
Switching Frequency Range	2 – 16 kHz adjustable
Frequency Precision Setting	Display: 0.1 Hz, Analog: High frequency / 8192
Output Frequency Resolution	0.007Hz for 50 Hz motor
Starting Torque	150% at 3 Hz in V/F
Transient Overtorque	170 – 200% of nominal motor torque depending on drive rating and type of motor
Braking Torque	Up to 150% of nominal motor torque with DBR Over 80% of the rated motor torque without DBR

Technical Specifications

Protection	
Motor Protection	Motor overload, Overcurrent, Motor short-circuit, Ground short-circuit, Motor e-thermal Protection (Motor thermal monitor), 1 Ph Output phase loss, 3 Ph Output phase loss (No motor detection)
Drive Protection	Error in precharge circuit, IGBT short circuit, Autotuning fault, Drive overheating, Overvoltage, Undervoltage, Input phase loss, Load short circuit, Field bus interruption, HMI communication, IGBT overheat
Process Protection	Motor Overspeed, Process Overload, Process Underload, AI 4-20 mA current loss, Load slipping, Brake control, Brake feedback, Safety fault, Speed feedback loss, Pulse or Encoder

Interface		
Logic (Digital) Inputs	Number	6 Nos. (4 Nos : Sink / Source)
	Type	24 Vdc (18 – 30 Vdc), Input Impedance : 3.5 kΩ
	Logic	Negative logic (Sink) : > 16 V (state 0), < 10 V (state 1) Positive logic (source) : 0 < 5 V (state 0), > 11 V (state 1)
	Specifications	Response time 8 ms at Stop
Pulse Inputs	Number	1 Nos. (Uses DI5)
	Specifications	• Pulse counter 0 to 30 kHz • Sampling time: 8 ms • 24 Vdc, Maximum input voltage 30 Vdc • Impedance : 3.5 kΩ
Sensor (PTC) Input	Number	1 Nos (Uses DI6)
	Specifications	• Trip threshold: 3 kΩ, reset threshold: 1.8 kΩ • Short-circuit detection threshold < 50 Ω
Analog Inputs	Number	3 Nos. (1 No : 0 – 20mA, 2 No : 0 – 10V)
	Type	Voltage : 0 – 10 V, impedance : 30 kΩ CCurrent : 0 – 20 mA, impedance : 250 Ω
	Specifications	• Resolution: 10 bits • Precision: ±0.5% at 25 °C (77 °F) & ±0.7% for a temperature variation of 60 °C • Linearity: ±0.2% (maximum ±0.5%) of full scale • Sampling time: 2 ms
Safety Input	Number	1 No.
	Specifications	• Input: +24 Vdc • Impedance: 1.5 kΩ
Digital Outputs	Number	3 Nos. (2 Relay + 1 Logic Output)
	Relay output	1 No. - Form C / Changeover Type, 1 No - Form A
	Capacity	Minimum switching capacity: 5 mA for 24 Vdc Maximum switching capacity: • on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 Vac and 30 Vdc • on resistive load (cos φ = 1 and L/R = 0): 3 A for 250 Vac and 30 Vdc (R1), 3 A for 250 Vac and 30 Vdc (R2) Refresh time: 2 ms
	Transistor Output	1 No. - Transistor Type
	Capacity	Voltage: 24 Vdc (maximum 30 Vdc) • max current output: 100 mA • refresh time: 2 ms
Analog Output	Number	1 No. (0 – 10 Vdc / 0 – 20 mA)
	Type	• Voltage : 0 – +10 Vdc (maximum voltage +1%), impedance: 470 Ω • Current : 0 – 20 mA, impedance: 800 Ω
	Specifications	• Resolution: 10 bits • Precision: ± 1% at 25 °C ± 10 °C, ±2% for a temperature variation of 60 °C • Linearity: ± 0.3% (of full scale) • Sampling time: 2 ms

Technical Specifications

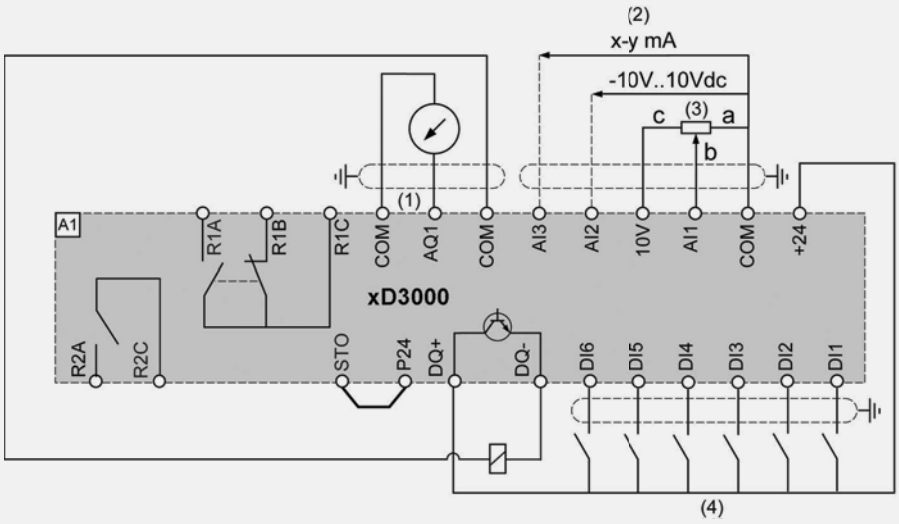
Environment	
Area of Use	Indoors. Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 2 Environment, conforming to IEC 61800-5-1)
Ambient temperature for operation	-10 – +50 °C (without derating) +50 – +60 °C (with derating factor)
Ambient temperature for storage	-25 – +70 °C
PCB Protection	Conformal coating class 3S2 for Dust and class 3C3 for Chemical pollution, complying to IEC 60721-3-3
Relative humidity	5 – 95% without condensation and without dripping water, conforming to IEC 60068-2-3 Class 3K5 according to EN 60721-3
Altitude 0 to 1,000 m 1,001 to 3,000 m	 Without derating With derating of 1% per additional 100 m
Maximum acceleration under vibrational stress (during operation)	10 m/s² at 13 – 200 Hz
Maximum deflection under vibratory load (during operation)	1.5 mm at 2 – 13 Hz
Maximum acceleration under shock impact (during operation)	150 m/s² at 11 ms

Communication	
Built-in Communication Protocol	Modbus, CANopen
Connector Type	RJ45 (on front face) for Modbus & CANopen
Physical Interface	2-wire RS 485 for Modbus & CANopen
Transmission Rate	4800 – 38400 bps for Modbus, 50 kbps - 1 Mbps for CANopen
Fieldbus Option Modules & Connector Type	Modbus TCP : Dual Port RJ45 Ethernet IP : Dual Port RJ45 PROFIBUS : Sub-D connector PROFINET : Dual Port RJ45 DeviceNet : 5 pin open style connector CANopen : Dual Port RJ45, Sub-D connector, 5 pin open style connector

Compliance	
Compliance with standards	CE, RoHS
Applicable Standard	IEC 61800-3 IEC 61800-5-1 IEC 60721-3
Electromagnetic Compatibility	IEC 61000-4-2 - Electrostatic discharge immunity test IEC 61000-4-3 - Radiated, radio-frequency, electromagnetic field immunity test IEC 61000-4-4 - Electrical fast transient/burst immunity test IEC 61000-4-5 - Surge immunity test IEC 61000-4-6 - Immunity to conducted disturbances, induced by radio-frequency fields IEC 61000-4-11 - Voltage dips, short interruptions and voltage variations immunity tests

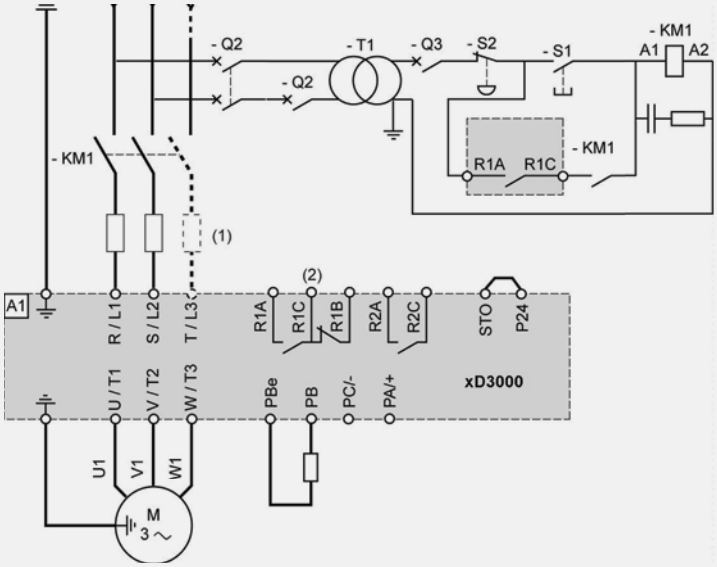
Power & Control Wiring

General Wiring Diagram



(1) Analog output
(2) Analog inputs
(3) Potentiometer SZ1RV1202 (2.2 kΩ) or similar (10 kΩ maximum)
(4) Digital Inputs - Shielding instructions are given in the Electromagnetic Compatibility section

Single or Three-phase Power Supply Diagram



(1) Line choke (if used).
(2) Use relay output R1 set to operating state Fault to switch Off the product once an error is detected.

Peripheral Devices

Circuit Breaker (MCCB/MPCB) & Main Contactor

CAT No.	Circuit Breaker						Main Contactor			
	MPCB		MCCB-DZ-Series		MCCB-DN-Series		MO		MNX	
	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating
	-	[A]	-	[A]	-	[A]	-	[A]	-	[A]
Input : 1-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)										
XD3000-01P5-1B2121	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-03P3-1B2121	MOG-H1M	6.3	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-03P7-1B2121	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-04P8-1B2121	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-06P9-1B2121	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-08P0-1B2121	MOG-H1M	20	DZ1-160N	20	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-11P0-1B2121	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 9	9	MNX 9	9
Input : 3-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)										
XD3000-01P5-2B2111	MOG-H1M	2.5	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-03P3-2B2111	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-03P7-2B2111	MOG-H1M	6.3	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-04P8-2B2111	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-06P9-2B2111	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-08P0-2B2111	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-11P0-2B2111	MOG-H1M	20	DZ1-160N	20	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-13P7-2B2111	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 12	12	MNX 12	12
XD3000-17P5-2B2111	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 18	18	MNX 18	18
XD3000-27P5-2B2111	MOG-H2M	40	DZ1-160N	40	DN0-100M	40	MO 25	25	MNX 25	25
XD3000-33P0-2B2111	MOG-H2M	50	DZ1-160N	50	DN0-100M	50	MO 32	32	MNX 32	32
XD3000-54P0-2B2111	MOG-H2M	63	DZ1-160N	63	DN0-100M	63	MO 40	40	MNX 40	40
XD3000-66P0-2B2111			DZ1-160N	100	DN0-100M	80	MO 50	50	MNX 50	50
Input : 3-Phase, 380 – 500 Vac (-15 – +10%), 50/60Hz (±5%)										
XD3000-01P5-4B2121	MOG-H1M	2.5	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-01P9-4B2121	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-02P3-4B2121	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-03P0-4B2121	MOG-H1M	6.3	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-04P1-4B2121	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-05P5-4B2121	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD3000-07P1-4B2121	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 18	18	MNX 18	18
XD3000-09P5-4B2121	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 18	18	MNX 18	18
XD3000-14P3-4B2121	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 18	18	MNX 18	18
XD3000-17P0-4B2121	MOG-H1M	32	DZ1-160N	32	DN0-100M	32	MO 25	25	MNX 25	25
XD3000-27P7-4B2121	MOG-H2M	40	DZ1-160N	40	DN0-100M	40	MO 40	40	MNX 40	40
XD3000-33P0-4B2121	MOG-H2M	50	DZ1-160N	50	DN0-100M	50	MO 50	50	MNX 50	50

Peripheral Devices

Input & Output Choke

CAT No.	Line (Input) Choke[2]	Semi-conductor fuses		DC Choke	Motor (Output) Choke[4]
	[mH] - [A]	[A]	Type		[mH] - [A]
Input : 1-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-1B2121	5.621 mH - 4 A	8	gR / aR	Not Applicable	4.904 mH - 2 A
XD3000-03P3-1B2121	3.239 mH - 6 A	12.5	gR / aR	Not Applicable	2.229 mH - 4 A
XD3000-03P7-1B2121	2.450 mH - 8 A	16	gR / aR	Not Applicable	1.988 mH - 4 A
XD3000-04P8-1B2121	1.911 mH - 10 A	20	gR / aR	Not Applicable	1.533 mH - 6 A
XD3000-06P9-1B2121	1.395 mH - 15 A	25	gR / aR	Not Applicable	1.066 mH - 8 A
XD3000-08P0-1B2121	1.074 mH - 20 A	40	gR / aR	Not Applicable	0.920 mH - 9 A
XD3000-11P0-1B2121	0.797 mH - 25 A	40	gR / aR	Not Applicable	0.669 mH - 15 A
Input : 3-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-2B2111	5.517 mH - 2 A	4	gR / aR	Not Applicable	4.904 mH - 2 A
XD3000-03P3-2B2111	3.065 mH - 4 A	8	gR / aR	Not Applicable	2.229 mH - 4 A
XD3000-03P7-2B2111	2.252 mH - 5 A	10	gR / aR	Not Applicable	1.988 mH - 4 A
XD3000-04P8-2B2111	1.752 mH - 7 A	12.5	gR / aR	Not Applicable	1.533 mH - 6 A
XD3000-06P9-2B2111	1.283 mH - 9 A	16	gR / aR	Not Applicable	1.066 mH - 8 A
XD3000-08P0-2B2111	0.994 mH - 15 A	20	gR / aR	Not Applicable	0.920 mH - 9 A
XD3000-11P0-2B2111	0.741 mH - 15 A	25	gR / aR	Not Applicable	0.669 mH - 15 A
XD3000-13P7-2B2111	0.590 mH - 20 A	40	gR / aR	Not Applicable	0.537 mH - 15 A
XD3000-17P5-2B2111	0.464 mH - 25 A	40	gR / aR	Not Applicable	0.421 mH - 20 A
XD3000-27P5-2B2111	0.312 mH - 40 A	63	gR / aR	Not Applicable	0.268 mH - 30 A
XD3000-33P0-2B2111	0.244 mH - 50 A	80	gR / aR	Not Applicable	0.223 mH - 35 A
XD3000-54P0-2B2111	0.182 mH - 65 A	100	gR / aR	Not Applicable	0.137 mH - 60 A
XD3000-66P0-2B2111	0.139 mH - 80 A	125	gR / aR	Not Applicable	0.112 mH - 70 A
Input : 3-Phase, 380 – 500 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-4B2121	9.982 mH - 3 A	4	gR / aR	Not Applicable	9.317 mH - 2 A
XD3000-01P9-4B2121	7.487 mH - 3 A	8	gR / aR	Not Applicable	7.355 mH - 2 A
XD3000-02P3-4B2121	5.823 mH - 4 A	8	gR / aR	Not Applicable	6.076 mH - 3 A
XD3000-03P0-4B2121	4.193 mH - 5 A	10	gR / aR	Not Applicable	4.659 mH - 4 A
XD3000-04P1-4B2121	3.276 mH - 7 A	12.5	gR / aR	Not Applicable	3.409 mH - 5 A
XD3000-05P5-4B2121	2.410 mH - 9 A	16	gR / aR	Not Applicable	2.541 mH - 6 A
XD3000-07P1-4B2121	1.889 mH - 15 A	20	gR / aR	Not Applicable	1.969 mH - 8 A
XD3000-09P5-4B2121	1.531 mH - 15 A	25	gR / aR	Not Applicable	1.471 mH - 10 A
XD3000-14P3-4B2121	1.013 mH - 25 A	40	gR / aR	Not Applicable	0.978 mH - 20 A
XD3000-17P0-4B2121	0.791 mH - 30 A	40	gR / aR	Not Applicable	0.823 mH - 20 A
XD3000-27P7-4B2121	0.573 mH - 40 A	63	gR / aR	Not Applicable	0.505 mH - 30 A
XD3000-33P0-4B2121	0.444 mH - 50 A	80	gR / aR	Not Applicable	0.424 mH - 35 A

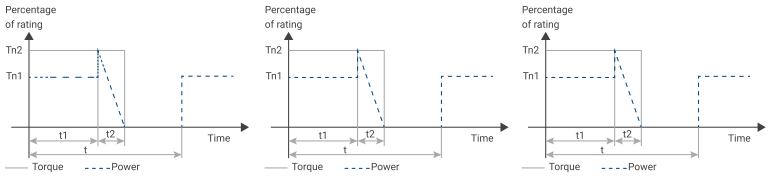
(2) - With line choke at 380 Vac supply voltage, considered 3% voltage drop in between the phases.
- Supply mains with significant disturbance from other equipment (interference, overvoltages)
- Supply mains with voltage imbalance between phases > 1.8% of nominal voltage
- Drive supplied by a supply mains with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- If line Isc is greater than the values in the table, add line chokes
- Installation of a large number of frequency inverters on the same supply mains

(4) Motor chokes are recommended;
- to limit the dv/dt at the motor terminals (500 to 1500 V/µs), for cables longer than 50 m/164.04 ft
- Reduce the motor ground leakage current
- Smooth the motor current wave form to reduce motor noise
- When VFD is connected to more than 2 motors in parallel
- When the motor cable length is higher than 25 m (shielded) or 50 m (unshielded)

Peripheral Devices

Braking Unit & Resistance

CAT No.	Braking Unit	DBR			
		Specification of Braking Resistor When ED is			Min. Resistance
		Light Braking Cycle	Medium Braking Cycle	Severe Braking Cycle	
		2%[5]	10%[6]	45%/5%[7]	
		[Ω] - [W]	[Ω] - [W]	[Ω] - [W]	[Ω]
Input : 1-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-1B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	40
XD3000-03P3-1B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	40
XD3000-03P7-1B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	40
XD3000-04P8-1B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	40
XD3000-06P9-1B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	27
XD3000-08P0-1B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	27
XD3000-11P0-1B2121	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	25
Input : 3-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-2B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	40
XD3000-03P3-2B2111	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	40
XD3000-03P7-2B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	40
XD3000-04P8-2B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	40
XD3000-06P9-2B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	27
XD3000-08P0-2B2111	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	27
XD3000-11P0-2B2111	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	25
XD3000-13P7-2B2111	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	16
XD3000-17P5-2B2111	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	16
XD3000-27P5-2B2111	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	8
XD3000-33P0-2B2111	Built-in	10 Ω - 1.1 kW	10 Ω - 3.4 kW	10 Ω - 19 kW	8
XD3000-54P0-2B2111	Built-in	8 Ω - 1.1 kW	8 Ω - 3.8 kW	8 Ω - 25 kW	5
XD3000-66P0-2B2111	Built-in	5 Ω - 1.9 kW	5 Ω - 6.9 kW	5 Ω - 32 kW	5

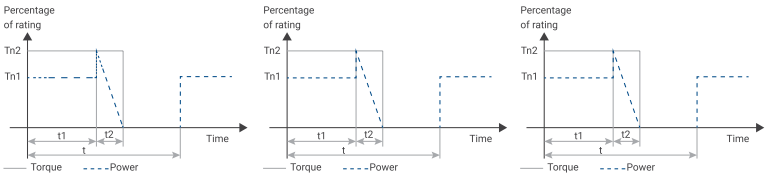


Light braking cycle | Medium braking cycle | Severe braking cycle

Peripheral Devices

Braking Unit & Resistance

CAT No.	Braking Unit	DBR			
		Specification of Braking Resistor When ED is			Min. Resistance
		Light Braking Cycle	Medium Braking Cycle	Severe Braking Cycle	
		2%(5)	10%(6)	45%/5%(7)	
		[Ω] - [W]	[Ω] - [W]	[Ω] - [W]	[Ω]
Input : 3-Phase, 380 – 500 Vac (-15 – +10%), 50/60Hz (±5%)					
XD3000-01P5-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	80
XD3000-01P9-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	80
XD3000-02P3-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	80
XD3000-03P0-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	54
XD3000-04P1-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	54
XD3000-05P5-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	54
XD3000-07P1-4B2121	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	54
XD3000-09P5-4B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	36
XD3000-14P3-4B2121	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	27
XD3000-17P0-4B2121	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	27
XD3000-27P7-4B2121	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	16
XD3000-33P0-4B2121	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	16



(5) Machines with low inertia
- Heavy Duty : 0.8 sec braking with 150% Braking Torque for 40 sec Cycle Time
- Normal Duty : 0.8 sec braking with 120% Braking Torque for 40 sec Cycle Time

(6) Machines with high inertia
- Heavy Duty : 4 sec braking with 165% Braking Torque for 40 sec Cycle Time
- Normal Duty : 4 sec braking with 135% Braking Torque for 40 sec Cycle Time

(7) Machines with very high inertia & vertical movement
- Heavy Duty : 54 sec braking with 100% braking torque and 6 sec braking with 165% Braking Torque for 120 sec Cycle Time

Accessories & Cable sizing

Accessories

CAT No.	Description
XDOP-DOP-100	IP54 LED Remote Keypad
XDOP-DOP-500	IP65 LCD Graphical Keypad
XDKT-DOP-500	Mounting kit for IP65 LCD Keypad
XDKT-ADP-V01	Communication Option Module Adapter
XDEN-SPD-V01	Speed Monitoring Card
XDCI-ETH-V01	Modbus TCP/EtherNet IP Comm. Card
XDCI-ECT-V01	EtherCAT Comm. Card
XDCI-PDP-V01	Profibus-DP Comm. Card
XDCI-DEN-V01	DeviceNet Comm. Card
XDCI-PLN-V01	POWERLINK Comm. Card
XDCI-PFN-V01	PROFINET Comm. Card
XDCI-CND-V01	CANopen DaisyChain Comm. Card
XDCI-CNS-V01	CANopen SUB-D Comm. Card
XDCI-CNT-V01	CANopen Terminals Comm. Card
XDSI-SIM-V01	Additional Safety Integrity Module

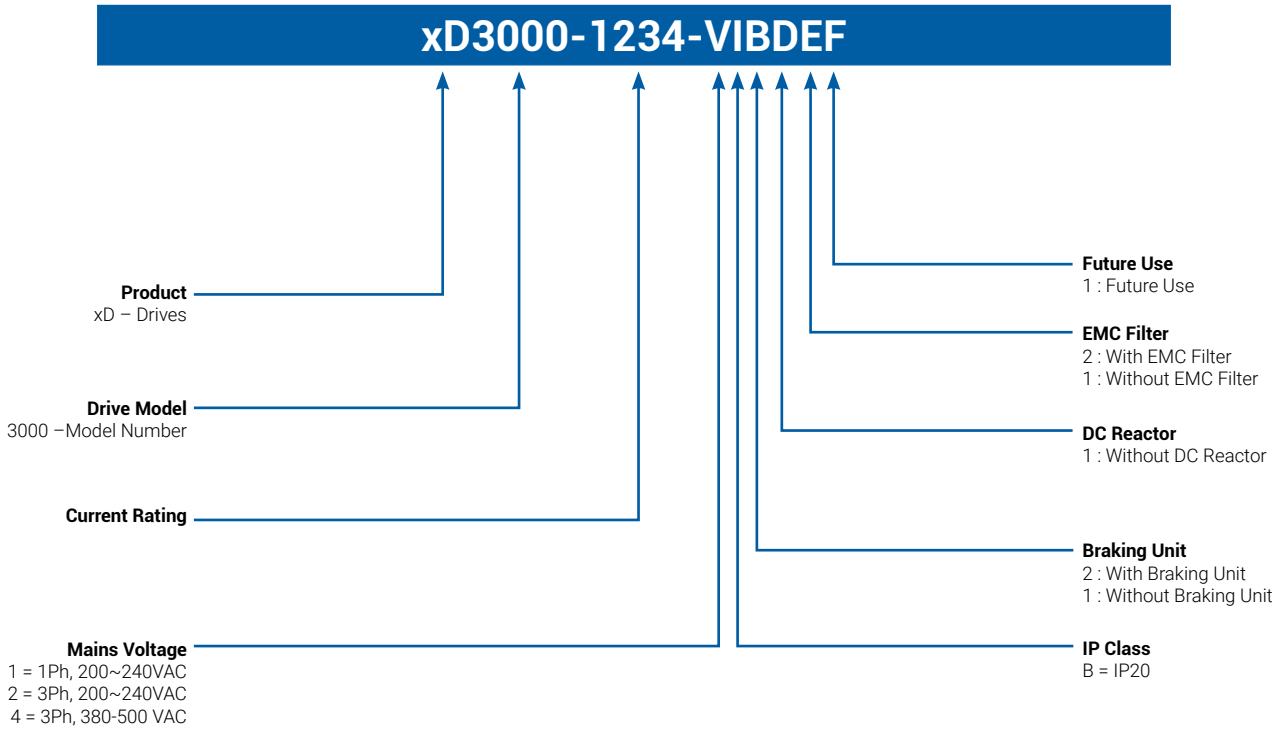
Cable sizing

CAT No.	Supply (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)
	mm² (AWG)	mm² (AWG)
XD3000-01P5-1B2121	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-03P3-1B2121	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-03P7-1B2121	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-04P8-1B2121	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-06P9-1B2121	4 - 6 (12 - 10)	4 - 6 (12 - 10)
XD3000-08P0-1B2121	4 - 6 (12 - 10)	4 - 6 (12 - 10)
XD3000-11P0-1B2121	6 (10)	6 (10)
XD3000-01P5-2B2111	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-03P3-2B2111	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-03P7-2B2111	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-04P8-2B2111	2.5 - 4 (14 - 12)	2.5 - 4 (14 - 12)
XD3000-06P9-2B2111	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-08P0-2B2111	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-11P0-2B2111	4 - 6 (12 - 10)	2.5 - 6 (14 - 10)
XD3000-13P7-2B2111	6 (10)	4 - 6 (12 - 10)
XD3000-17P5-2B2111	6 (10)	6 (10)
XD3000-27P5-2B2111	10 - 16 (8 - 6)	10 - 16 (8 - 6)
XD3000-33P0-2B2111	16 (6)	16 (6)
XD3000-54P0-2B2111	16*2 (6*2)	16*2 (6*2)
XD3000-66P0-2B2111	16*2 (6*2)	16*2 (6*2)

Accessories & Cable sizing

Cable sizing

CAT No.	Supply (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)
	mm² (AWG)	mm² (AWG)
XD3000-01P5-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-01P9-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-02P3-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-03P0-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-04P1-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-05P5-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-07P1-4B2121	2.5 - 6 (14 - 10)	2.5 - 6 (14 - 10)
XD3000-09P5-4B2121	4 - 6 (12 - 10)	2.5 - 6 (14 - 10)
XD3000-14P3-4B2121	10 - 16 (8 - 6)	10 - 16 (8 - 6)
XD3000-17P0-4B2121	16 (6)	16 (6)
XD3000-27P7-4B2121	16*2 (6*2)	16*2 (6*2)
XD3000-33P0-4B2121	16*2 (6*2)	16*2 (6*2)



Product Dimensions

CAT No.	Width	Height	Height (With EMC plate)	Depth	Weight	Frame Size
	[mm]	[mm]	[mm]	[mm]	[kg]	
Input : 1-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)						
XD3000-01P5-1B2121	72	143	188	109	0.8	S1C
XD3000-03P3-1B2121	72	143	188	128	1	
XD3000-03P7-1B2121	72	143	188	143	1.1	
XD3000-04P8-1B2121	72	143	188	143	1.1	
XD3000-06P9-1B2121	105	142	188	158	1.6	S2C
XD3000-08P0-1B2121	105	142	188	158	1.6	
XD3000-11P0-1B2121	105	142	188	158	1.6	
Input : 3-Phase, 200 – 240 Vac (-15 – +10%), 50/60Hz (±5%)						
XD3000-01P5-2B2111	72	143	188	109	0.8	S1C
XD3000-03P3-2B2111	72	143	188	128	0.9	
XD3000-03P7-2B2111	72	143	188	138	1	
XD3000-04P8-2B2111	72	143	188	138	1	
XD3000-06P9-2B2111	105	143	189	138	1.4	S2C
XD3000-08P0-2B2111	105	143	189	138	1.4	
XD3000-11P0-2B2111	105	143	189	138	1.4	
XD3000-13P7-2B2111	140	184	228	158	2.2	S3C
XD3000-17P5-2B2111	140	184	228	158	2.2	
XD3000-27P5-2B2111	150	232	308	178	3.5	S4C
XD3000-33P0-2B2111	150	232	308	178	3.6	
XD3000-54P0-2B2111	180	330	404	198	6.8	S5C
XD3000-66P0-2B2111	180	330	404	198	6.9	

Product Dimensions

CAT No.	Width	Height	Height (With EMC plate)	Depth	Weight	Frame Size
	[mm]	[mm]	[mm]	[mm]	[kg]	
Input : 3-Phase, 380 – 500 Vac (-15 – +10%), 50/60Hz (±5%)						
XD3000-01P5-4B2121	105	142	188	158	1.2	S2C
XD3000-01P9-4B2121	105	142	188	158	1.2	
XD3000-02P3-4B2121	105	142	188	158	1.2	
XD3000-03P0-4B2121	105	142	188	158	1.3	
XD3000-04P1-4B2121	105	142	188	158	1.3	
XD3000-05P5-4B2121	140	184	228	158	2.1	S3C
XD3000-07P1-4B2121	140	184	228	158	2.1	
XD3000-09P5-4B2121	140	184	228	158	2.2	
XD3000-14P3-4B2121	150	232	308	178	2.2	S4C
XD3000-17P0-4B2121	150	232	308	178	2.2	
XD3000-27P7-4B2121	180	330	404	198	6.8	S5C
XD3000-33P0-4B2121	180	330	404	198	6.9	

xD4000 Series

Range: 0.37kW HD ~ 315kW ND

The xD4000 Drive is a highly advanced variable frequency drive designed for demanding applications in industries such as manufacturing, water treatment, and process automation. Featuring a powerful control algorithm, the xD4000 provides precise motor control and exceptional performance, ensuring optimal operation across various load conditions. Its extensive connectivity options enable easy integration with existing automation systems, while built-in energy-saving features help reduce operational costs. The xD4000 also boasts a user-friendly interface for quick setup and intuitive operation, making it an excellent choice for enhancing efficiency and productivity in any industrial environment.

Contents

xD4000

User benefits

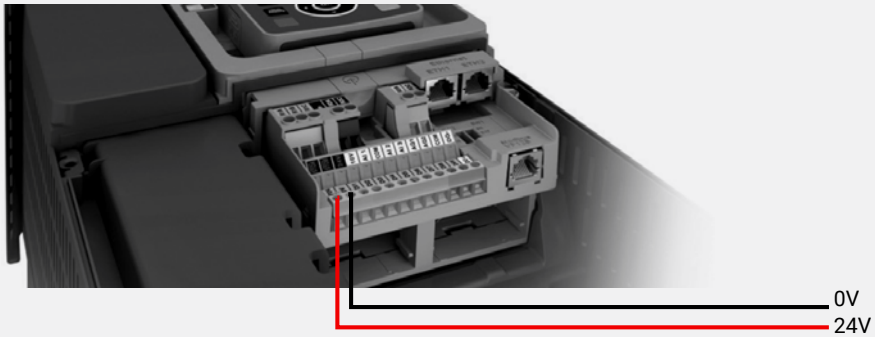
Interactive & easy to use Graphical LCD keypad

- Detachable type to mount on panel door with accessory
- 8 line, IP65, 2 colour backlit LCD type
  (red – when fault, white in normal mode)
- Displays bar charts, gauges & trends
- 24 languages integrated & can be added further
- Built-in battery to support :
  - RTC functions
  - Data acquisition
  - Time stamping even when drive is stopped
  - Fault history with real time
  - 10-years life for battery

- 4 function keys to facilitate navigation and provide links for enabling functions
- Embedded dynamic QR code for contextual instantaneous access to online help
- Copy & paste configuration from drive to drive and PC to drive,
  capable to store up to 16 configuration files.

External 24VDC connection in absence of 3Ph supply

- To keep VFD display / control circuitry ON
- To keep fieldbus communication live
- To monitor IO Status and control Digital Input & Digital Output



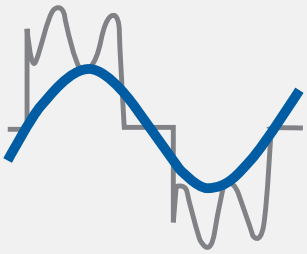
User benefits

Reliable & Rugged

- Built-in DC Reactor over entire range :
  - around 40% at rated load
  - around 48% at 80% load
  - Protection to capacitor bank and inverter circuit against voltage fluctuations
  - Reducing ripples in DC bus to allow drive to motor cable length up to 300 mtrs without output filter and up to 1000 mtrs with dV/dt / sinus filters for motor complying to IEC60034-25

Built-in EMC filter entire range :

- Complies to category C2 as per IEC 61800-3 up to 45kW & C3 for balance ratings
- Complies to category C1 with external EMC filter
- Improves drives immunity against external noise and allows a path to dissipate internal noise through ground



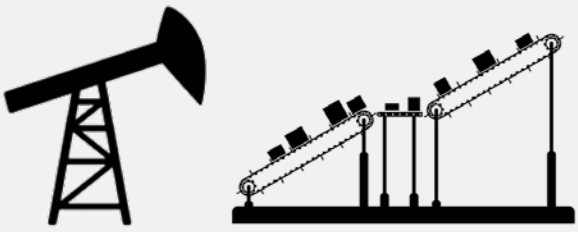
Motor cable length (unshielded cable)	Motor conforming to IEC60034-25	Motor NOT conforming to IEC60034-25
1m (3.28ft) <Lm < 50 m (164 ft)	Filter not required	dV/dt filter
50m (164ft) <Lm < 100 m (328 ft)	Filter not required	Sinus filter
100m (328ft) <Lm < 300 m (984 ft)	Filter not required	Sinus filter
300m (984ft) <Lm < 500 m (1640 ft)	dV/dt filter	Sinus filter
500m (1640ft) <Lm < 1000 m (3280 ft)	Sinus filter	Sinus filter

General purpose functions

- Torque boost
- Configure multiple functions on one input at a same time
- Mains Contactor Control
- Output Contactor Control
- Slip compensation
- Acceleration profiles : Linear, S curve, U curve, Customise S curve
- 16 preset speeds
- Automatic restart
- Cooling fan control
- Fast stop ramp divider
- Delinearization for Analog Inputs
- Reference Addition, Subtraction & Multiplication
- IGBT Test - On power up & before RUN command
  - Drive output short-circuit
  - IGBT inoperable
  - IGBT short-circuited

Plenty of application-oriented features to smooth out process applications

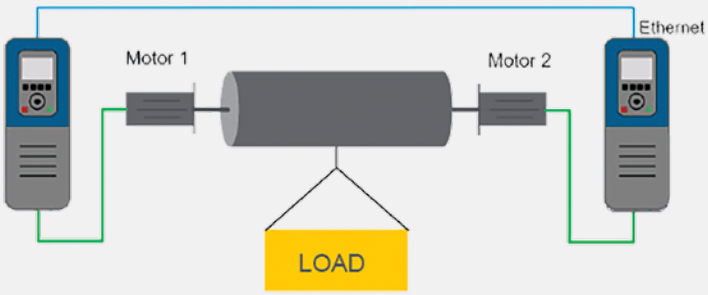
- V/F control, Advanced Vector Control with encoder and without encoder feedback for Induction Motors; PM motor control methods for PM & reluctance motors
- Master Slave function with onboard Ethernet Port :
  - 1 master drive – 10 slave drives (speed synchronisation over Ethernet)
  - Speed & Torque master slave for common shaft / load sharing applications like :
    - Dual motor Kiln in DRI plant
    - Tandem Crane, Grab Crane
    - Long belt conveyor
    - Parallel chain in stentor (textile)



User benefits

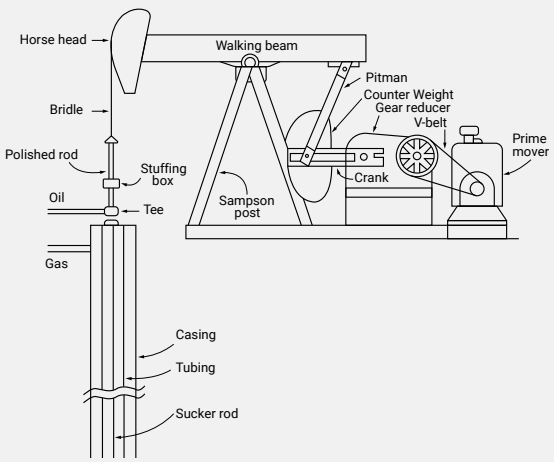
Master Slave - MultiDriveLink

- This system is essential for Torque sharing application where two or more motors have their shaft directly coupled together.
- Slave drive will adjust its output to match the torque difference between itself and master drive to balance the load.
- MultiDrive Link function allows direct communication between a drives group. This communication is done through an Ethernet link between each drives
- Topology - Drives can be connected in Daisy chain, Star, Redundant ring with RSTP Switch
- Advantages:
  - Easy cabling: Connection through Standard Ethernet Cables
  - Better management of the Torque: Loads are well balanced with digital precision
  - Easier balancing: no complex tuning of analog inputs for a good load balancing. Equilibrium is performed automatically



ENA (ENergy Adaptation) / Sucker rod function for Oil & Gas Industry

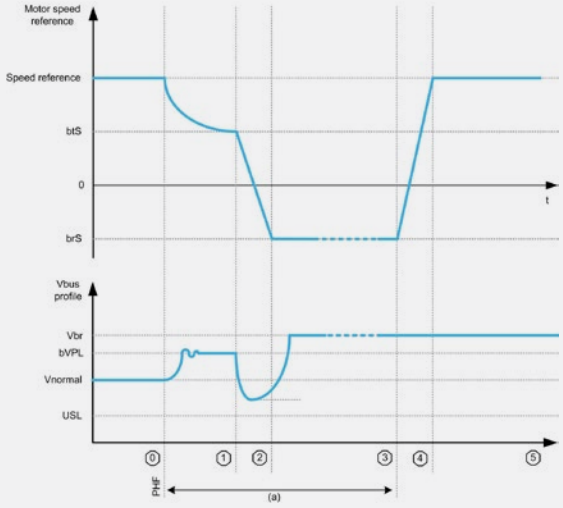
- ENA (Energy Adaptation) System is a control profile designed for rotating machines with unbalanced load. It is used primarily for oil pumps
- During the deceleration, motor acts as a generator and feeding power back into the VFD which results into Overvoltage tripping in VFD if braking resistors are not used.
- ENA System allows:
  Operation without a braking resistor.
  Reduces mechanical stress on the rod.
  Reduces line current fluctuations.
  Reduces energy consumption.



User benefits

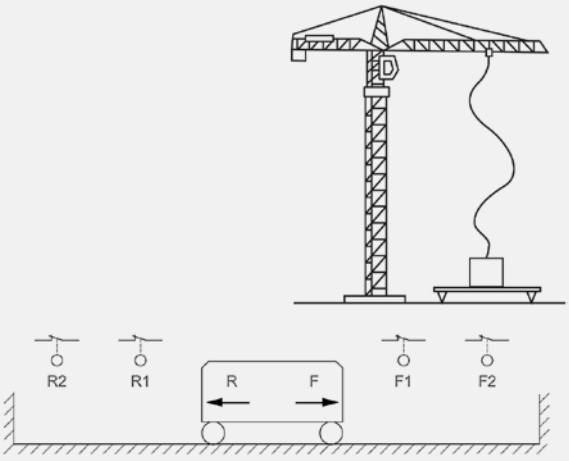
Backspin control

- PCP (Progressive Cavity Pump) is moving up the fluid. In the event of a mains fault and if the motor is in freewheel & there are fluid in the column, the fluid will go down and make the pump moving in the other direction.
- Backspin function uses the regenerative energy the of the fluid to control the backspin speed.
- When the main power returns, the motor will move in forward direction, and it will start the production again.



Plenty of application-oriented features to smooth out process applications

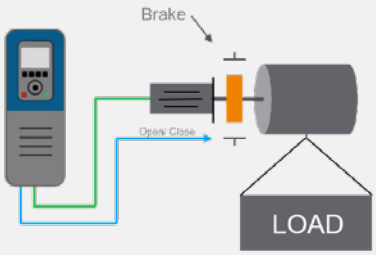
- Crane specific functions:
  - Built-in Braking Transistor till 160kW HD
  - Brake control with brake feedback
  - High speed hoisting
  - Rope slack
  - External weight measurement
  - Dynamic load detection
- Open loop & closed loop torque control for winders
- Positioning by Limit Switches or Sensors

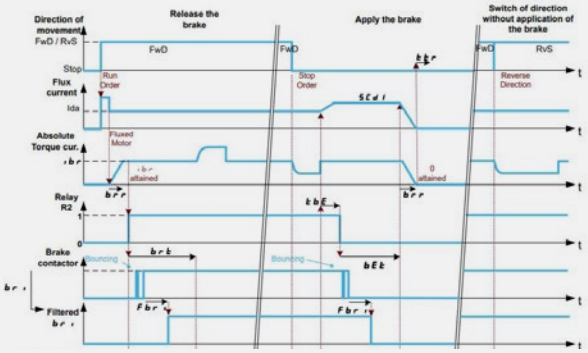


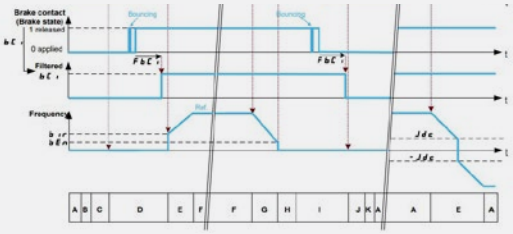
User benefits

Brake control adapted for horizontal & vertical movement

- It provides external brake control function for Vertical load such as Crane/Hoist and Horizontal movement such as Long Travel & Cross Travel
- User can set separate set for Brake Release & Brake Engage
  - Brake Release : Current, Time, Frequency
  - Brake Engage : Frequency, Delay, Time
  - Additional Interlock : Brake Feedback, Brake Contactor Feedback, Brake Restart Sequence, load slip monitoring (Closed Loop)
- Separate brake release current for Hoisting and Lowering (Forward & Reverse)

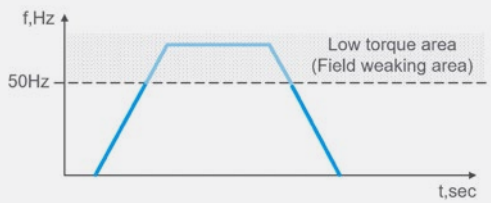






High speed hoisting and Rope Slack

- **High Speed Hoisting**
  - This function allows adaption of the motor speed according to the load
  - In case of Hoisting. If the load is lower than the nominal load, it is possible to increase hoisting speed, even higher than nominal motor speed.
  - For example, increase speed of **EMPTY** crane hook while lower & raise
- **Rope Slack**
  - This function allows to prevent starting up at high speed when load has been set down to ground and the rope is still slack.
  - This function manages the movement in order to :
    - Avoid uneven winding of the cable on the drum
    - Prevent rope brake and stress on jib crane when the cable is suddenly tight



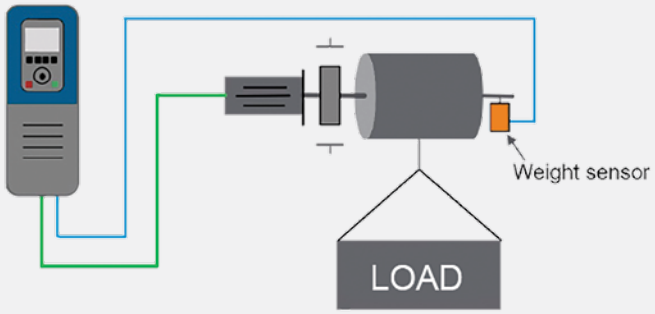
High Speed Hoisting

Rope Slack

User benefits

External Load measurement using weight sensor

- This function uses the information supplied by a weight sensor to adapt the Brake Release Current.
- If the weight is significant, the drive automatically increases the brake release current, if weight is less then, brake release current decreases.
- This will be useful to reduce jerk during the start of work if we applied high brake release current to small load.



Dynamic load detect / Load variation detection

- This function is only possible with the high-speed hoisting function.
- It will used to detect if an obstacle has been reached, triggering a sudden increase or decrease in the load.
- There are two possible detection modes,
  - ***Speed reference mode*** – Current is compared with initial speed, if exceeded, the drive will switch to fault mode.
  - ***Current limitation mode*** – An increase in load will result in a drop in speed, when the motor frequency drops below certain limit the drive will switch to fault mode.

User benefits

Torque limitation & Torque Control

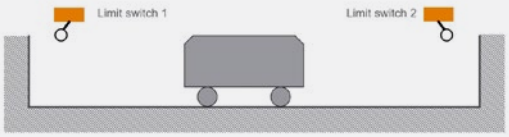
- Torque Limitation / Control
  This function allows to limit motor torque .

  For example, VFD is used to control gate barrier.
  In this case we can limit the torque, so even barrier is lowered onto the car, it stops and will not push with all his strength. This will keep the barrier & car intact.

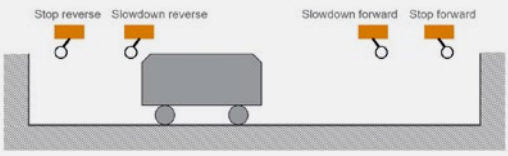
  Another example, VFD is used for winding-unwinding applications, where the diameter of the drum changes while in operation. If the diameter increase, the speed should decrease.

Positioning by Limit Switches or Sensors

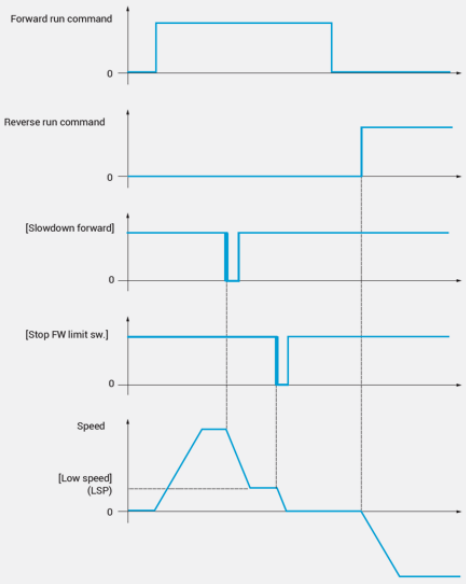
- This function is used for managing positioning using position sensors or limit switches linked to digital inputs.
- We can configure two types of command – Stopping and Slowing Down
- Stop mode of the VFD is configurable.
- When the stop contact is activated then only movement in other direction is authorised.



Limit switch management



Positioning with Limit switches



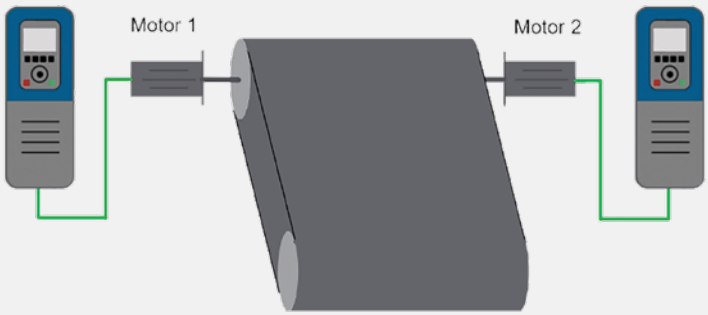
User benefits

Additional application specific functions

- Motor surge limit function for Old and Rewound Motors
- Motor / Generator Torque Limit
- Load sharing
- Backlash compensation
- Power Backup Mode (To operate VFD temporary during power outage)
- Kinetic Energy Buffering (KEB) or maintain the DC bus voltage
- Motor thermal monitoring through PTC, PT100, PT1000, and KTY84 thermal probes
- Built-In PID :
  - 4 preset PID reference using digital inputs
  - Wake up & sleep mode
  - Sleep Boost
  - PID predictive speed (Pre-PID frequency)

Load sharing

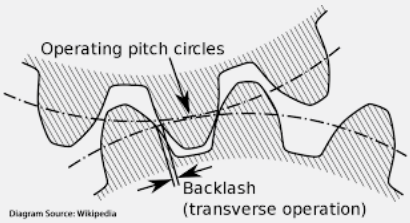
- When 2 motors are connected mechanically and therefore at the same speed, and each is controlled by a drive, this function can be used to improve torque distribution between the two motors
- Consider a system where two motors are mechanically linked. If Motor-1 is loaded more than Motor-2, it will slowdown Motor-1 & load on Motor-2 will increase. (Example : DRI Kiln, tandem Crane, Radar, long conveyor belt etc)

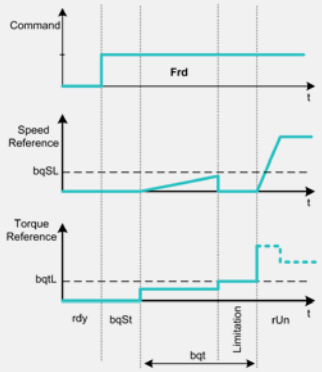


User benefits

Backlash sequence

- Reducing the wear on mechanical elements:
  - The main principle of the backlash sequence is to regulate a speed at start up under a torque limitation allowing motion until the backlash is fully compensated.
  - Then, the load torque will become greater than the torque limitation and stop the movement
- Advantages:
  - Reduce the wear of the mechanical gears
  - Save money on maintenance and downtime reduction





Additional application specific functions

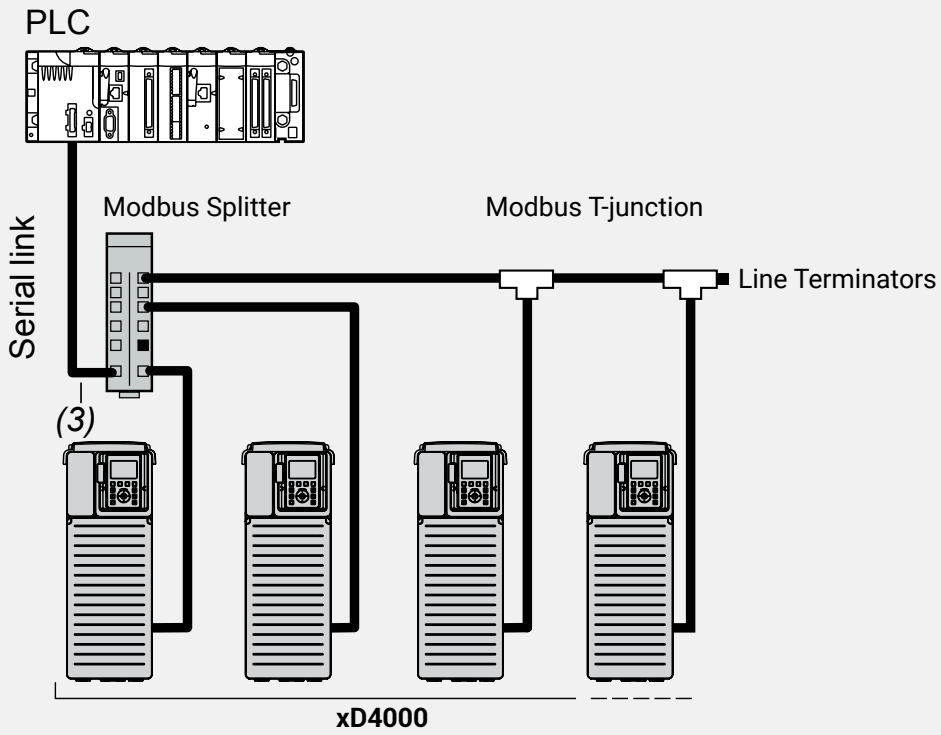
- Sleep/Wake-Up in Speed Control Mode
- Stall prevention :
  - Deceleration ramp time adaptation
  - Current limit during running
- Skip (jump) frequency
- Catch on the fly (Speed search / flying start)
- Fault inhibition (Fire mode)
- DC braking (During stopping)
- Error detect disabling (Fire Mode)
- Multiconfiguration Mode

Pump specific features

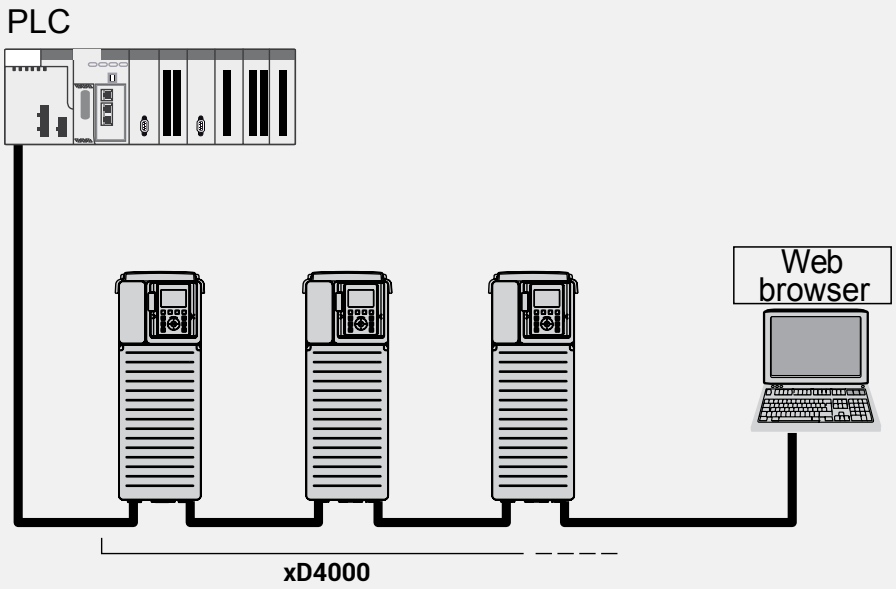
- Built-in PID Function:
  - 4 preset PID reference using digital inputs
  - Wake up & sleep mode
  - Sleep Boost
  - PID predictive speed (Pre-PID frequency)
- Feedback (Pipe Break/End of curve) Monitoring
  - Fire hydrant opened
  - Pump start-up with open discharge valve
  - Mechanical breakdown of pipes
  - Water leakage
- ENA (Energy Adaptation)
- Backspin Control for PCP pumps
- Pump cycle monitoring
  - Monitor no. of start
  - Avoid unwanted aging

User benefits

Modbus RTU Serial Link Protocol

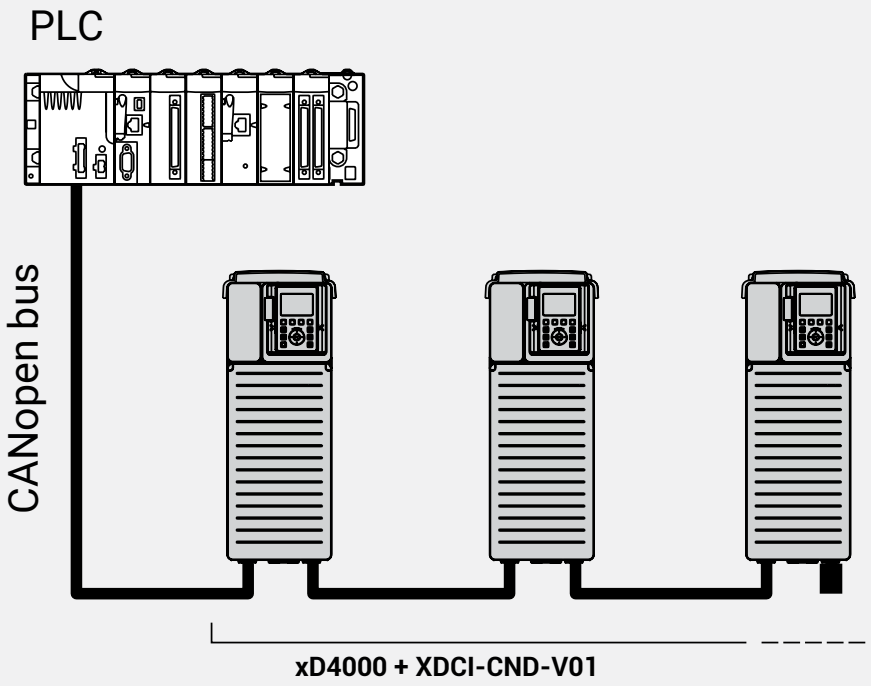


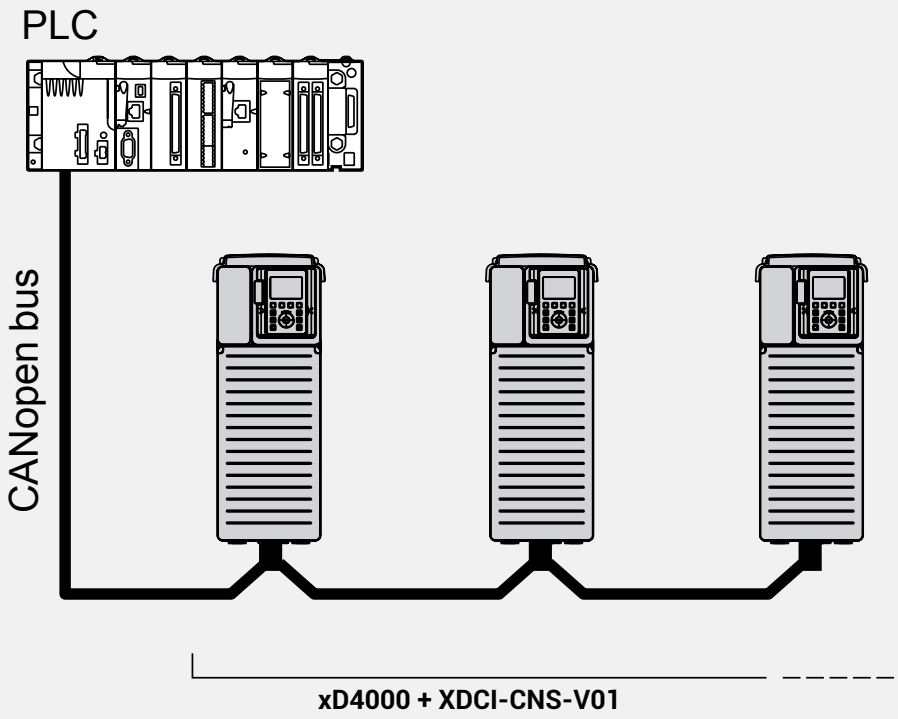
Ethernet IP Protocol



Network Architecture

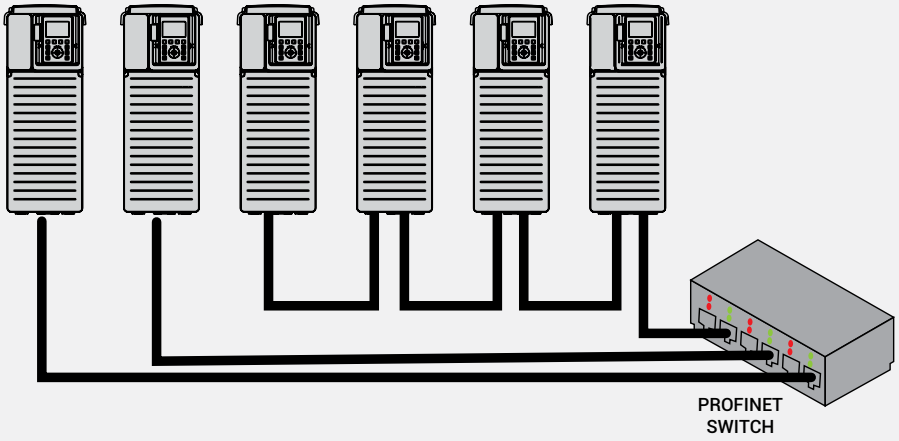
CANopen bus



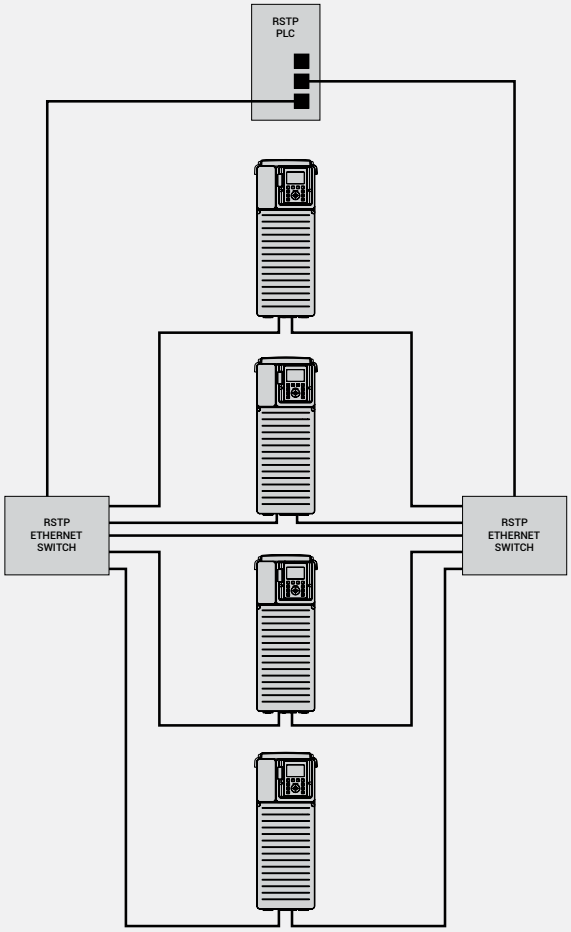


Network Architecture

Profinet Daisy or Star Network



RSTP Ethernet Network



Current & Power Ratings

Input : 3-Phase, 380-480VAC (-15%, +10%), 50/60Hz (±5%)										
CAT No.	Rated Output[1]				Rated Input					
	P_{ND}	I_{ND}	P_{HD}	I_{HD}	Apparent Power at 380V		I_{ND} at 380V	I_{HD} at 380V	I_{ND} at 480V	I_{HD} at 480V
	(kW)	(A)	(kW)	(A)	kVA (ND)	kVA (HD)	(A)	(A)	(A)	(A)
XD4000-02P2-4C2221	0.75	2.2	0.37	1.5	1.1	0.7	1.5	0.9	1.3	0.8
XD4000-04P0-4C2221	1.5	4.0	0.75	2.2	2.2	1.2	3.0	1.7	2.6	1.5
XD4000-05P6-4C2221	2.2	5.6	1.5	4.0	3.2	2.4	4.3	3.1	3.8	2.9
XD4000-07P2-4C2221	3.0	7.2	2.2	5.6	4.2	3.3	5.8	4.5	5.1	4.0
XD4000-09P3-4C2221	4.0	9.3	3.0	7.2	5.6	4.5	7.6	6.0	6.7	5.4
XD4000-12P7-4C2221	5.5	12.7	4.0	9.3	7.6	6.0	10.4	8.0	9.1	7.2
XD4000-16P5-4C2221	7.5	16.5	5.5	12.7	9.9	7.6	13.8	10.5	11.9	9.2
XD4000-23P5-4C2221	11	23.5	7.5	16.5	14.1	10.4	19.8	14.1	17.0	12.5
XD4000-31P7-4C2221	15	31.7	11	23.5	19.4	15.0	27.0	20.6	23.3	18.1
XD4000-39P2-4C2221	18.5	39.2	15	31.7	24.0	20.3	33.4	27.7	28.9	24.4
XD4000-46P3-4C2221	22	46.3	18.5	39.2	28.6	24.9	39.6	34.1	34.4	29.9
XD4000-61P5-4C2221	30	61.5	22	46.3	38.2	29.8	53.3	40.5	45.9	35.8
XD4000-74P5-4C2221	37	74.5	30	61.5	47.6	40.2	66.2	54.8	57.3	48.3
XD4000-88P0-4C2221	45	88.0	37	74.5	57.4	49.1	79.8	67.1	69.1	59.0
XD4000-106P-4C2221	55	106.0	45	88.0	70.0	59.7	97.2	81.4	84.2	71.8
XD4000-145P-4C2221	75	145.0	55	106.0	93.7	72.2	131.3	98.9	112.7	86.9
XD4000-173P-4C2221	90	173.0	75	145.0	112.9	98.2	156.2	134.3	135.8	118.1
XD4000-211P-4B2221	110	211.0	90	173.0	121.8	102.6	201.0	170.0	165.0	143.0
XD4000-250P-4B2221	132	250.0	110	211.0	161.4	121.8	237.0	201.0	213.0	165.0
XD4000-302P-4B2221	160	302.0	132	250.0	201.3	161.4	284.0	237.0	262.0	213.0
XD4000-427P-4A2221	220	427.0	160	302.0	247.0	187.0	397.0	296.0	324.0	246.0
XD4000-481P-4A1221	250	481.0	200	387.0	279.0	229.0	451.0	365.0	366.0	301.0
XD4000-616P-4A1221	315	616.0	250	481.0	351.0	286.0	569.0	457.0	461.0	375.0

Normal duty use	
I_{ND}	Continuous current with 120% overload for 60 secs.
P_{ND}	Maximum capacity in Normal Duty usage

Heavy duty use	
I_{HD}	Continuous current with 150% overload for 60 secs.
P_{HD}	Maximum capacity in Heavy Duty usage

Technical Specifications

Standard Specifications	
Range	0.37 – 250 kW (HD) / 0.75 – 315 kW (ND)
Enclosure type	IP21 till 90 kW (ND); IP20 from 110 kW (ND) to 160 kW (ND); IP00 from 220 kW (ND) to 315 kW (ND)
Isolation type	Galvanic Isolation
Overloading Capacity	Heavy Duty : 150% of rated current for 1 min Normal Duty : 120% of rated current for 1 min
Max Output Voltage	Proportional to Input Voltage
Max Output Frequency	0.1 – 599 Hz
Rated Voltage	380 – 480 V (-15 – +10%)
Rated Frequency	50/60 Hz (± 5%)
Displacement Power Factor	≈ 0.99
True Power Factor	≈ 0.90
Efficiency at full load	94.9 - 98.6%
%THDi	38 – 47%
Built-In Keypad	Advance Graphical LCD Keypad (Connected to RJ45 port), IP65 Protection
EMC Filter Category	• Internal EMC filter compliance with standard IEC/EN 61800-3, category C2 or C3 in environment 1 or 2 • External EMC filter is mandatory required to fulfill the IEC/EN 61800-3 C1 category

Control Details	
Control Method	• **Open Loop** - - Asynchronous Motor: V/F - 5 Points, Slip Compensation, Energy Saving, Voltage (Sensorless) Vector Control (SVC V) - Synchronous Motor: Permanent magnet control law, Permanent magnet control law for variable torque - Reluctance motor: Reluctance motor control law • **Closed Loop -** - Asynchronous Motor: Current (Full flux) vector control law - Synchronous Motor: Permanent magnet control law
V/F Patterns	Linear, S Ramp, U Ramp, Customized (S Curve)
Acceleration / Deceleration Time	0.0 s – 6000 s
Nominal Switching Frequency	Values depending on the rating; see the corresponding SKU's datasheet for more information.
Switching Frequency Range	Values depending on the rating; see the corresponding SKU's datasheet for more information.
Frequency Precision Setting	Display: 0.1 Hz Analog: High frequency / 8192
Output Frequency Resolution	0.007Hz for 50 Hz motor
Starting Torque	150% at 3 Hz in V/F
Transient Overtorque	Up to 180% of nominal motor torque depending on drive rating and type of motor
Braking Torque	Up to 150% of nominal motor torque with DBR Around 20% in average of the nominal motor torque at low speed without DBR

Protection	
Motor Protection	Motor overload, Overcurrent, Motor short-circuit, Ground short-circuit, Motor e-thermal Protection (Motor thermal monitor), 1 Ph Output phase loss, 3 Ph Output phase loss (No motor detection)
Drive Protection	Error in precharge circuit, IGBT short circuit, Autotuning fault, Drive overheating Overvoltage, Undervoltage, Input phase loss, Load short circuit, Field bus interruption HMI communication, IGBT overheat
Process Protection	Motor Overspeed, Process Overload, Process Underload, AI 4-20 mA current loss Load slipping, Brake control, Brake feedback, Safety fault, Speed feedback loss - Pulse or Encoder

Technical Specifications

Interface		
Logic (Digital) Inputs	Number	8 Nos. (Sink / Source)
	Type	24 Vdc (30 Vdc Max), Input Impedance : 3.5 kΩ
	Logic	Negative logic (Sink) : > 16 V (state 0), < 10 V (state 1) Positive logic (source) : 0 < 5 V (state 0), > 11 V (state 1)
	Specifications	Sampling time: 2 ms + 0.5 ms max.
Pulse Inputs	Number	2 Nos. (Uses DI7 & DI8)
	Specifications	• Pulse counter 0 to 30 kHz • Comply with level 1 PLC, IEC 65A-68 standard • State 0 if < 0.6 Vdc, state 1 if > 2.5 Vdc • Cyclic ratio: 50% ± 10% • Sampling time: 5 ms + 1 ms max. • 24 Vdc, Maximum input voltage 30 Vdc, < 10 mA
Sensor (PTC) Input	Number	1 No. (Uses DI6)
	Specifications	• Trip threshold: 3 kΩ, reset threshold: 1.8 kΩ • Short-circuit detection threshold < 50 Ω
Analog Inputs	Number	3 Nos. (2 Nos: 0–10Vdc / 0–20mA, 1 No: -10–10Vdc)
	Type	Voltage : 0 – 10 V, impedance : 31.5 kΩ Current : 0 – 20 mA, impedance : 250 Ω AI2, AI3 can be configure to temperature probe or water level sensor
	Specifications	• Resolution: 12 bits • Accuracy: ± 0.6% for a temperature variation of 60 °C • Linearity ± 0.15% of maximum value • Sampling time: 1 ms + 1 ms max.
Safety Inputs	Number	2 Nos.
	Specifications	• Input: +24 Vdc (30 Vdc max.) • Impedance: 2.2 kΩ
Digital Outputs	Number	4 Nos. (3 Relay + 1 Logic Output)
	Relay output	1 No. - Form C / Changeover Type, 2 Nos - Form A
	Capacity	Minimum switching capacity: 5 mA for 24 Vdc Maximum switching capacity: • on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 Vac and 30 Vdc • on resistive load (cos φ = 1 and L/R = 0): 3 A for 250 Vac and 30 Vdc (R1), 5 A for 250 Vac and 30 Vdc (R2 & R3) Refresh time: 1 ms ± 0.25 ms
	Transistor Output	1 No. - Transistor Type
Pulse Outputs	Number	1 No. (Uses DQ+)
	Specifications	"• Frequency Range: 0 to 30 kHz • Maximum voltage: 30 Vdc • Maximum current: 20 mA • Open collector not insulated"
Analog Outputs	Number	2 Nos. (0 – 10 Vdc / 0 – 20 mA)
	Type	• Voltage : 0 – +10 Vdc (maximum voltage +1%), impedance: 470 Ω • Current : 0 – 20 mA, impedance: 500 Ω
	Specifications	• Resolution: 10 bits • Accuracy: ± 1% for a temperature variation of 60 °C • Linearity: ± 0.2% • Sampling time: 5 ms + 1 ms max.

Technical Specifications

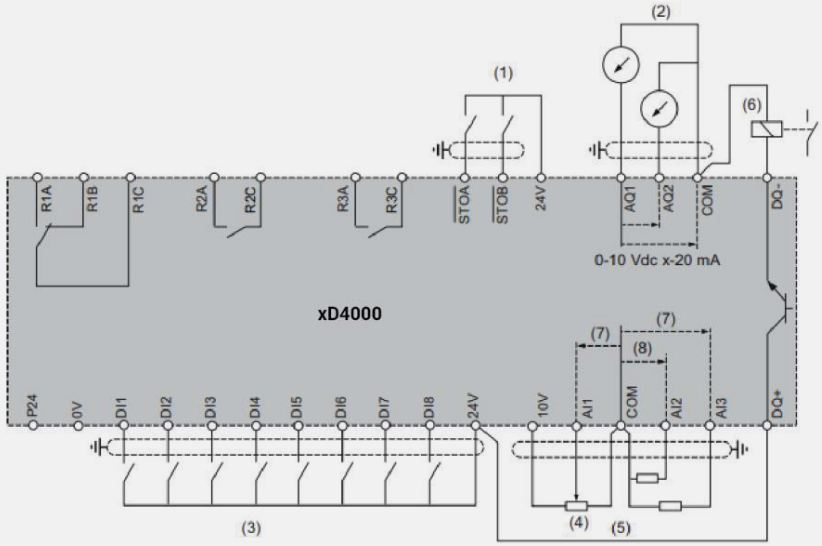
Environment	
Area of Use	Indoors. Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 2 Environment, conforming to IEC 61800-5-1)
Ambient temperature for operation	Frame S1-S6 : -15 - +50°C (Without derating) Frame S1-S6 : +50 - +60°C (With derating) Frame S7 : -10 - 40°C (Without derating) Frame S7 : +50 - +60°C (With derating)
Ambient temperature for storage	-40 – +70 °C
PCB Protection	Frame S1 – S6 : Conformal coating class 3S3 for Dust and class 3C3 for Chemical pollution & class 3M3 for Mechanical Condition, complying to IEC 60721-3-3 Frame S7 : Conformal coating class 3S2 for Dust and class 3C2 for Chemical pollution & class 3M3 for Mechanical Condition, complying to IEC 60721-3-3
Relative humidity	5 – 95% without condensation and without dripping water, conforming to IEC 60068-2-3 Class 3K5 according to EN 60721-3
Altitude 0 to 1,000 m 1,001 to 4,800 m	 Without derating With derating of 1% per additional 100 m
Vibration Resistance	1.5 mm peak to peak (f= 2 to 13 Hz) conforming to IEC 60068-2-6 1 gn (f= 13 to 200 Hz) conforming to IEC 60068-2-6
Shock Resistance	15 gn for 11 ms conforming to IEC 60068-2-27
Type of cooling	Forced fan cooling structure

Communication	
Built-in Communication Protocol	Modbus, Modbus TCP or Ethernet IP
Connector Type	1 RJ45 port for Modbus & 2 RJ45 ports for Modbus TCP or Ethernet IP
Physical Interface	2-wire RS 485 for Modbus & Ethernet
Transmission Rate	4800 – 38400 bps for Modbus, 10, 100 Mbps for Ethernet
Fieldbus Option Modules & Connector Type	PROFIBUS : Sub-D connector PROFINET : Dual Port RJ45 with S2 Redundancy option available DeviceNet : 5 pin open style connector CANopen : Dual Port RJ45, Sub-D connector, 5 pin open style connector

Compliance	
Standards	CE, RoHS
Applicable Standard	IEC 61800-3 IEC 61800-5-1 IEC 60721-3
Electromagnetic Compatibility	IEC 61000-4-2 - Electrostatic discharge immunity test IEC 61000-4-3 - Radiated, radio-frequency, electromagnetic field immunity test IEC 61000-4-4 - Electrical fast transient/burst immunity test IEC 61000-4-5 - Surge immunity test IEC 61000-4-6 - Immunity to conducted disturbances, induced by radio-frequency fields IEC 61000-4-11 - Voltage dips, short interruptions and voltage variations immunity tests

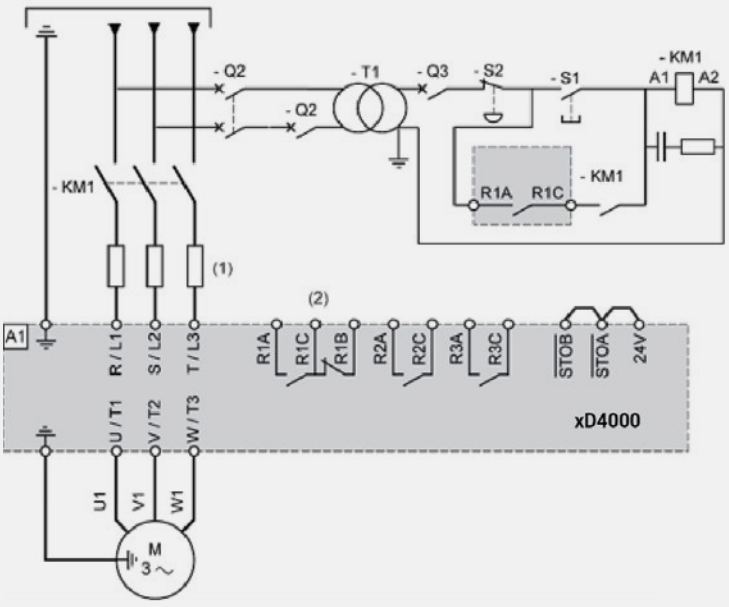
Power & Control Wiring

Control Wiring Diagram



(1)	STO Safe Torque Off	(5)	Analog Input
(2)	Analog Output	(6)	Digital output
(3)	Digital Input - Shielding instructions are given in the Electromagnetic Compatibility	(7)	0-10 Vdc, x-20 mA
(4)	Reference potentiometer	(8)	0-10 Vdc, -10 Vdc...+10 Vdc.

Power Wiring Diagram



Peripheral Devices

Circuit Breaker & Main Contactor

CAT No.	Circuit Breaker						Main Contactor			
	MPCB		MCCB-DZ Series		MCCB-DN Series		MO		MNX	
	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating
	-	[A]	-	[A]	-	[A]	-	[A]	-	[A]
XD4000-02P2-4C2221	MOG-H1M	2.5	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD4000-04P0-4C2221	MOG-H1M	4	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD4000-05P6-4C2221	MOG-H1M	6.3	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD4000-07P2-4C2221	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD4000-09P3-4C2221	MOG-H1M	10	DZ1-160N	16	DN0-100M	32	MO 9	9	MNX 9	9
XD4000-12P7-4C2221	MOG-H1M	16	DZ1-160N	16	DN0-100M	32	MO 18	18	MNX 18	18
XD4000-16P5-4C2221	MOG-H1M	20	DZ1-160N	20	DN0-100M	32	MO 18	18	MNX 18	18
XD4000-23P5-4C2221	MOG-H1M	25	DZ1-160N	25	DN0-100M	32	MO 25	25	MNX 25	25
XD4000-31P7-4C2221	MOG-H1M	32	DZ1-160N	32	DN0-100M	32	MO 25	25	MNX 25	25
XD4000-39P2-4C2221	MOG-H2M	40	DZ1-160N	40	DN0-100M	40	MO 40	40	MNX 40	40
XD4000-46P3-4C2221	MOG-H2M	50	DZ1-160N	50	DN0-100M	50	MO 50	50	MNX 50	50
XD4000-61P5-4C2221	MOG-H2M	63	DZ1-160N	63	DN0-100M	63	MO 50	50	MNX 50	50
XD4000-74P5-4C2221			DZ1-160N	100	DN0-100M	80	MO 70	70	MNX 70	70
XD4000-88P0-4C2221			DZ1-160N	125	DN1-160M	125	MO 80	80	MNX 80	80
XD4000-106P-4C2221			DZ1-160N	125	DN1-160M	125	MO 80	80	MNX 80	80
XD4000-145P-4C2221			DZ1-160N	160	DN1-160M	160	MO 140	140	MNX 140	140
XD4000-173P-4C2221			Available on Req		DN2-250M	250	MO 185	185	MNX 185	185
XD4000-211P-4B2221			Available on Req		DN2-250M	250	MO 225	225	MNX 225	225
XD4000-250P-4B2221			Available on Req		DN3-400M	320	MO 300	300	MNX 300	300
XD4000-302P-4B2221			Available on Req		DN3-400M	400			MNX 400	400
XD4000-427P-4A2221			Available on Req		DN3-630M	500			MNX 400	400
XD4000-481P-4A1221			Available on Req		DN3-630M	500			MNX 550	550
XD4000-616P-4A1221			Available on Req		DN4-1250N	800			MNX 650	650

Peripheral Devices

Input & Output Choke

CAT No.	Line (Input) Choke (2)	Semi-conductor fuses		DC Choke	Motor (Output) Choke (4)
	[mH] - [A]	[A]	Type		[mH] - [A]
XD4000-02P2-4C2221	13.975 mH - 2 A	4	gR / gS / aR	Built-in	6.352 mH - 3 A
XD4000-04P0-4C2221	6.988 mH - 3 A	8	gR / gS / aR	Built-in	3.494 mH - 5 A
XD4000-05P6-4C2221	4.875 mH - 5 A	10	gR / gS / aR	Built-in	2.496 mH - 6 A
XD4000-07P2-4C2221	3.614 mH - 6 A	12	gR / gS / aR	Built-in	1.941 mH - 8 A
XD4000-09P3-4C2221	2.759 mH - 8 A	16	gR / gS / aR	Built-in	1.503 mH - 10 A
XD4000-12P7-4C2221	2.016 mH - 15 A	20	gR / gS / aR	Built-in	1.101 mH - 15 A
XD4000-16P5-4C2221	1.519 mH - 15 A	25	gR / gS / aR	Built-in	0.847 mH - 20 A
XD4000-23P5-4C2221	1.059 mH - 20 A	40	gR / gS / aR	Built-in	0.595 mH - 25 A
XD4000-31P7-4C2221	0.777 mH - 30 A	50	gR / gS / aR	Built-in	0.441 mH - 35 A
XD4000-39P2-4C2221	0.628 mH - 35 A	63	gR / gS / aR	Built-in	0.357 mH - 45 A
XD4000-46P3-4C2221	0.530 mH - 40 A	80	gR / gS / aR	Built-in	0.302 mH - 50 A
XD4000-61P5-4C2221	0.394 mH - 55 A	100	gR / gS / aR	Built-in	0.228 mH - 65 A
XD4000-74P5-4C2221	0.317 mH - 70 A	125	gR / gS / aR	Built-in	0.188 mH - 80 A
XD4000-88P0-4C2221	0.263 mH - 80 A	160	gR / gS / aR	Built-in	0.159 mH - 95 A
XD4000-106P-4C2221	0.216 mH - 100 A	160	gR / gS / aR	Built-in	0.132 mH - 115 A
XD4000-145P-4C2221	0.160 mH - 135 A	250	gR / gS / aR	Built-in	0.097 mH - 155 A
XD4000-173P-4C2221	0.135 mH - 160 A	250	gR / gS / aR	Built-in	0.081 mH - 185 A
XD4000-211P-4B2221	0.105 mH - 205 A	315	gR / gS / aR	Built-in	0.067 mH - 225 A
XD4000-250P-4B2221	0.089 mH - 240 A	350	gR / gS / aR	Built-in	0.056 mH - 265 A
XD4000-302P-4B2221	0.074 mH - 285 A	400	gR / gS / aR	Built-in	0.047 mH - 320 A
XD4000-427P-4A2221	0.053 mH - 400 A	630	aR	Built-in	0.033 mH - 450 A
XD4000-481P-4A1221	0.047 mH - 455 A	700	aR	Built-in	0.030 mH - 510 A
XD4000-616P-4A1221	0.037 mH - 570 A	800	aR	Built-in	0.023 mH - 650 A

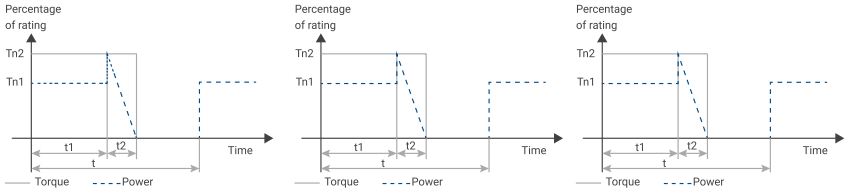
(2)
- With line choke at 380 Vac supply voltage, considered 3% voltage drop in between the phases.
- Supply mains with significant disturbance from other equipment (interference, overvoltages)
- Supply mains with voltage imbalance between phases > 1.8% of nominal voltage
- Drive supplied by a supply mains with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- If line Isc is greater than the values in the table, add line chokes
- Installation of a large number of frequency inverters on the same supply mains

(4)
Motor chokes are recommended;
- to limit the dv/dt at the motor terminals (500 to 1500 V/µs), for cables longer than 50 m/164.04 ft
- Reduce the motor ground leakage current
- Smooth the motor current wave form to reduce motor noise
- When VFD is connected to more than 2 motors in parallel
- When the motor cable length is higher than 25 m (shielded) or 50 m (unshielded)

Peripheral Devices

Braking Unit & Resistance

CAT No.	Braking Unit	DBR			
		Specification of Braking Resistor When ED is			Min. Resistance
		Light Braking Cycle[5]	Medium Braking Cycle[6]	Severe Braking Cycle[7]	
		2%[5]	10%[6]	45% / 5%[7]	
		[Ω] - [W]	[Ω] - [W]	[Ω] - [W]	[Ω]
XD4000-02P2-4C2221	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	56
XD4000-04P0-4C2221	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	56
XD4000-05P6-4C2221	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	56
XD4000-07P2-4C2221	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	34
XD4000-09P3-4C2221	Built-in	100 Ω - 0.1 kW	100 Ω - 0.26 kW	100 Ω - 1.7 kW	34
XD4000-12P7-4C2221	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	23
XD4000-16P5-4C2221	Built-in	60 Ω - 0.16 kW	60 Ω - 0.5 kW	60 Ω - 2.9 kW	19
XD4000-23P5-4C2221	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	12
XD4000-31P7-4C2221	Built-in	28 Ω - 0.3 kW	28 Ω - 0.96 kW	28 Ω - 5.1 kW	15
XD4000-39P2-4C2221	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	15
XD4000-46P3-4C2221	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	15
XD4000-61P5-4C2221	Built-in	16 Ω - 1.1 kW	16 Ω - 1.9 kW	16 Ω - 14 kW	10
XD4000-74P5-4C2221	Built-in	10 Ω - 1.1 kW	10 Ω - 3.4 kW	10 Ω - 19 kW	10
XD4000-88P0-4C2221	Built-in	10 Ω - 1.1 kW	10 Ω - 3.4 kW	10 Ω - 19 kW	10
XD4000-106P-4C2221	Built-in	8 Ω - 1.1 kW	8 Ω - 3.8 kW	8 Ω - 25 kW	2.5
XD4000-145P-4C2221	Built-in	5 Ω - 1.9 kW	5 Ω - 6.9 kW	5 Ω - 32 kW	2.5
XD4000-173P-4C2221	Built-in	5 Ω - 1.9 kW	5 Ω - 6.9 kW	10 Ω - 19 kW x 2 Nos	2.5
XD4000-211P-4B2221	Built-in	2.5 Ω - 3.2 kW	2.5 Ω - 11 kW	5 Ω - 32 kW x 2 Nos	1.9
XD4000-250P-4B2221	Built-in	2.5 Ω - 3.2 kW	2.5 Ω - 11 kW	5 Ω - 32 kW x 2 Nos	1.9
XD4000-302P-4B2221	Built-in	2.5 Ω - 3.2 kW	2.5 Ω - 11 kW	5 Ω - 32 kW x 2 Nos	1.9
XD4000-427P-4A2221	Built-in	1.4 Ω - 5.1 kW	1.4 Ω - 29 kW	5 Ω - 32 kW x 3 Nos	1.4
XD4000-481P-4A1221	External	1.4 Ω - 5.1 kW	1.4 Ω - 29 kW	5 Ω - 32 kW x 3 Nos	1.05
XD4000-616P-4A1221	External	2.5 Ω - 3.2 kW x 2 Nos	1.4 Ω - 29 kW	5 Ω - 32 kW x 4 Nos	1.05



Light cycle

t = 40 s t1 = 0 s t2 = 0.8 s Tn1 = 0 Tn2 = 1.5 x Tn	t: period Tn1: braking torque Tn2: braking torque Tn: nominal torque

Light braking cycle

- Normal duty: 0.8 s braking with a 1.2 Tn braking torque for a 40 s cycle
- Heavy duty: 0.8 s braking with a 1.5 Tn braking torque for a 40 s cycle

Medium cycle

t = 40 s t1 = 0 s t2 = 4 s Tn1 = 0 Tn2 = 1.65 x Tn	t: period Tn1: braking torque Tn2: braking torque Tn: nominal torque

Medium braking cycle

- Normal duty: 4 s braking with a 1.35 Tn braking torque for a 40 s cycle
- Heavy duty: 4 s braking with a 1.65 Tn braking torque for a 40 s cycle

Severe cycle

t = 120 s t1 = 54 s t2 = 6 s Tn1 = Tn Tn2 = 1.65 x Tn	t: period Tn1: braking torque Tn2: braking torque Tn: nominal torque

Severe braking cycle

- Heavy Duty : 54 sec braking with 100% braking torque and 6 sec braking with 165% Braking Torque for 120 sec Cycle Time

(5)	Machines with low inertia	- Heavy Duty : 0.8 sec braking with 150% Braking Torque for 40 sec Cycle Time - Normal Duty : 0.8 sec braking with 120% Braking Torque for 40 sec Cycle Time
(6)	Machines with high inertia	- Heavy Duty : 4 sec braking with 165% Braking Torque for 40 sec Cycle Time - Normal Duty : 4 sec braking with 135% Braking Torque for 40 sec Cycle Time
(7)	Machines with very high inertia & vertical movement	- Heavy Duty : 54 sec braking with 100% braking torque and 6 sec braking with 165% Braking Torque for 120 sec Cycle Time

Accessories & Cable sizing

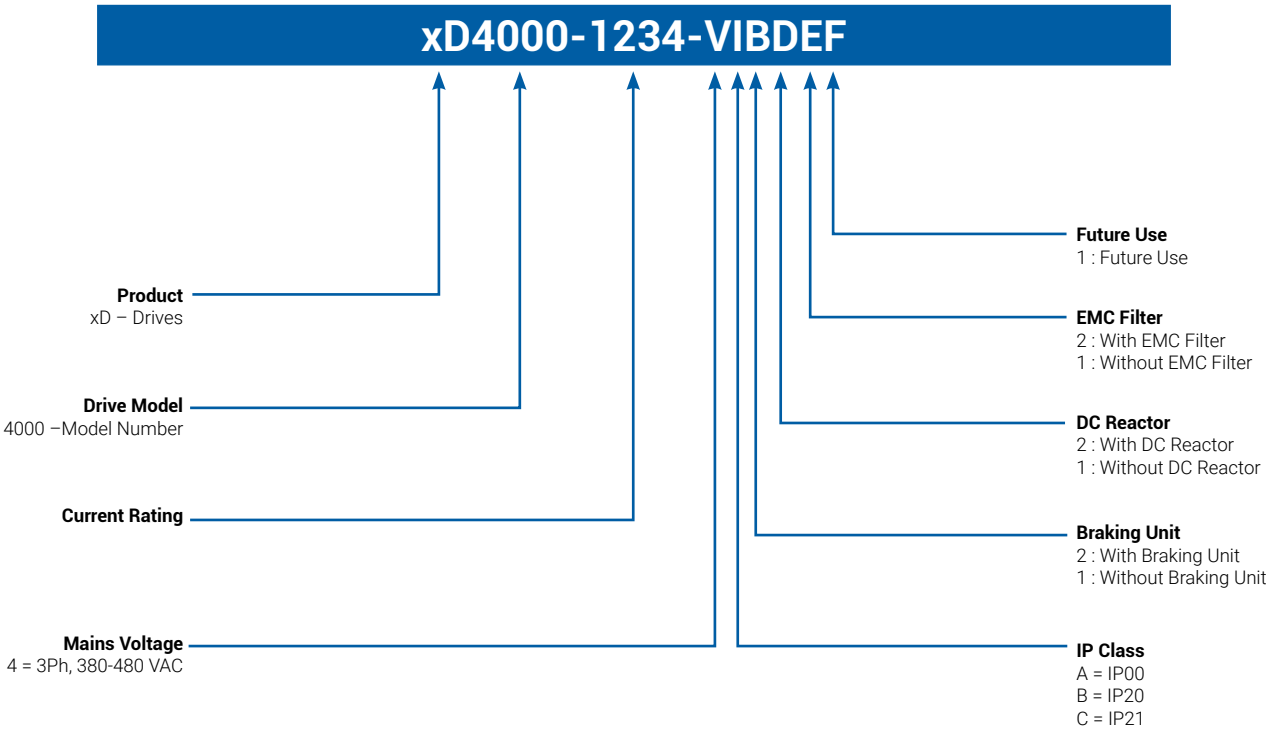
Accessories

CAT No.	Description
XDOP-DOP-500	IP65 LCD Graphical Keypad
XDKT-DOP-500	Mounting kit for IP65 LCD Keypad
XDIO-EX1-V01	IO Expansion Card-1 - 6DI,2DO,2AI
XDIO-EX2-V01	IO Expansion Card-2 - 3RO
XDEN-DEI-V01	Digital Encoder Interface Card
XDEN-AEI-V01	Analog Encoder Interface Module
XDEN-REI-V01	Resolver Interface Module
XDEN-HEI-V01	HTL Encoder Interface Module
XDCI-ECT-V01	EtherCAT Comm. Card
XDCI-PDP-V01	Profibus-DP Comm. Card
XDCI-DEN-V01	DeviceNet Comm. Card
XDCI-PLN-V01	POWERLINK Comm. Card
XDCI-PFN-V01	PROFINET Comm. Card
XDCI-PFN-V02	PROFINET Comm. Card - Redundant
XDCI-CND-V01	CANopen DaisyChain Comm. Card
XDCI-CNS-V01	CANopen SUB-D Comm. Card
XDCI-CNT-V01	CANopen Terminals Comm. Card
XDSI-SIM-V01	Additional Safety Integrity Module
XDBU-200K-100	Dynamic Braking Unit - 200kW

Accessories & Cable sizing

Cable sizing

CAT No.	Cable Sizes	
	Supply (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)
	mm² (AWG)	mm² (AWG)
XD4000-02P2-4C2221	2.5 (14)	2.5 (14)
XD4000-04P0-4C2221	2.5 (14)	2.5 (14)
XD4000-05P6-4C2221	2.5 (14)	2.5 (14)
XD4000-07P2-4C2221	2.5 (14)	2.5 (14)
XD4000-09P3-4C2221	2.5 (14)	2.5 (14)
XD4000-12P7-4C2221	2.5 (14)	4 (12)
XD4000-16P5-4C2221	4 (12)	6 (10)
XD4000-23P5-4C2221	6 (10)	6 (10)
XD4000-31P7-4C2221	10 (8)	10 (8)
XD4000-39P2-4C2221	10 (8)	10 (8)
XD4000-46P3-4C2221	10 (8)	16 (6)
XD4000-61P5-4C2221	25 (4)	25 (4)
XD4000-74P5-4C2221	35 (3)	35 (3)
XD4000-88P0-4C2221	35 (2)	50 (1)
XD4000-106P-4C2221	70 (1/0)	70 (1/0)
XD4000-145P-4C2221	95 (3/0)	95 (3/0)
XD4000-173P-4C2221	120 (4/0)	120 (250MCM)
XD4000-211P-4B2221	2 x 50 (2 x 1/0)	2 x 50 (2 x 1/0)
XD4000-250P-4B2221	2 x 70 (2 x 2/0)	2 x 70 (2 x 2/0)
XD4000-302P-4B2221	2 x 95 (2 x 3/0)	2 x 95 (2 x 3/0)
XD4000-427P-4A2221	2 x 150 (2 x 350MCM)	2 x 150 (2 x 350MCM)
XD4000-481P-4A1221	4 x 185 (3 x 350MCM)	4 x 185 (3 x 350MCM)
XD4000-616P-4A1221	4 x 185 (3 x 350MCM)	4 x 185 (3 x 350MCM)



Product Dimensions

CAT No.	Width	Height	Depth	Weight	Frame Size
	[mm]	[mm]	[mm]	[kg]	
XD4000-02P2-4C2221	144	350	206	4.5	S1
XD4000-04P0-4C2221	144	350	206	4.5	
XD4000-05P6-4C2221	144	350	206	4.5	
XD4000-07P2-4C2221	144	350	206	4.6	
XD4000-09P3-4C2221	144	350	206	4.6	
XD4000-12P7-4C2221	144	350	206	4.7	
XD4000-16P5-4C2221	171	409	236	7.7	S2
XD4000-23P5-4C2221	171	409	236	7.7	
XD4000-31P7-4C2221	211	545.9	235	13.6	S3
XD4000-39P2-4C2221	211	545.9	235	14.2	
XD4000-46P3-4C2221	211	545.9	235	14.3	
XD4000-61P5-4C2221	226	673	274	28.0	S4
XD4000-74P5-4C2221	226	673	274	28.2	
XD4000-88P0-4C2221	226	673	274	28.7	
XD4000-106P-4C2221	290	922	325.5	57.5	S5
XD4000-145P-4C2221	290	922	325.5	59.0	
XD4000-173P-4C2221	290	922	325.5	59.5	
XD4000-211P-4B2221	320	1205	393	104	S6
XD4000-250P-4B2221	320	1205	393	104	
XD4000-302P-4B2221	320	1205	393	104	S7A
XD4000-427P-4A2221	440	1195	380	172	
XD4000-481P-4A1221	598	1195	380	203	S7B
XD4000-616P-4A1221	598	1195	380	203	

Segmentation & Applications

Segment	Application	xD1000	xD2000	xD3000	xD4000
Water & Waste Water - Lift irrigation	Intake Pump		√		√
Water & Waste Water - Lift irrigation	Booster Pump		√		√
Water & Waste Water - Lift irrigation	Lifting Pump		√		√
Water & Waste Water - STP	Aeration Blower		√		√
Water & Waste Water - STP	Circulating Pump	√	√		√
Water & Waste Water - STP	Drain Pump		√		√
Water & Waste Water - STP	Centrifuge		√		√
Water & Waste Water - WTP	Clarifloculator Centrifuge		√		√
Water & Waste Water - WTP	Centrifugal Pump (HSC, VT etc)		√		√
Water & Waste Water - Rural water pumping	Submersible Pump - Grid	√	√		√
Chemical & Petrochemical	Oil Transfer Pump		√		√
Chemical & Petrochemical	Central Water Injection Pump		√		√
Chemical & Petrochemical	Sucker Rod Pump			√	√
Chemical & Petrochemical	Cooling Fan	√	√		√
Chemical & Petrochemical	Draft Fan		√		√
Chemical & Petrochemical	Compressor		√	√	√
Chemical & Petrochemical	Conveyor	√		√	√
Chemical & Petrochemical	Overhead crane			√	√
Chemical & Petrochemical	Slurry Pump	√	√		
Chemical & Petrochemical	Agitator	√	√	√	√
Chemical & Petrochemical	Centrifuge		√	√	√
Food & Beverage - All	Conveyor	√		√	√
Food & Beverage - Sugar	Conveyor	√		√	√
Food & Beverage - Sugar	Drum feeder	√		√	√
Food & Beverage - Sugar	Injection pump	√	√		
Food & Beverage - Sugar	Spray Pump	√	√		
Food & Beverage - Sugar	Rake Carrier				√
Food & Beverage - Sugar	Feeder table	√		√	
Food & Beverage - Sugar	Sugar Mill				√
Food & Beverage - Sugar	Cane carrier				√
Food & Beverage - Sugar	Juice pumps	√	√		
Food & Beverage - Sugar	Boiler feed pumps		√		√
Food & Beverage - Sugar	Draft Fan		√		√
Food & Beverage - Sugar	Compressor		√		√
Food & Beverage - Sugar	Grooved Roller Pressure Feeder				√
Food & Beverage - Sugar	Cane Cutter				√
Food & Beverage - Rice Mill	Whitener	√	√		
Food & Beverage - Rice Mill	Silky	√	√		
Food & Beverage - Rice Mill	Blowers	√			
Food & Beverage - Rice Mill	Grader	√			
Food & Beverage - Tea	Trough fan	√			

Segmentation & Applications

Segment	Application	xD1000	xD2000	xD3000	xD4000
Food & Beverage - Tea	Rotor Ventilation fan	√			
Food & Beverage - Tea	Continuous Fermenting Machine	√			
Food & Beverage - Tea	Hot air ID fan	√			
Food & Beverage - Tea	Cold air ID fan	√			
Food & Beverage - Tea	Ball Breaker	√			
Food & Beverage - Tea	Dryer	√	√		√
Food & Beverage - Tea	Ghooghie machine	√			
Food & Beverage - Tea	Hydro	√			
Food & Beverage - Tea	CTC	√	√		√
Food & Beverage - Ethanol	Hammer Mill				√
Food & Beverage - Ethanol	Pump		√		√
Food & Beverage - Ethanol	Fan		√		√
Food & Beverage - Distillery	Cooling tower fan	√	√		
Food & Beverage - Distillery	ID Fan		√		√
Food & Beverage - Distillery	SA Fan		√		√
Food & Beverage - Distillery	DA Fan		√		√
Food & Beverage - Distillery	Boiler feed pumps		√		√
Food & Beverage - Distillery	Slop transfer pump	√	√		√
Food & Beverage - Distillery	Main circulating water cooling pump		√		√
Food & Beverage - Distillery	Cooling tower pump	√	√		√
Food & Beverage - Distillery	Auxiliary pumps		√		√
Food & Beverage - Distillery	Hammer Mill				√
Food & Beverage - Distillery	Drum extractor	√		√	
Food & Beverage - Distillery	Drag Chain Feeder	√		√	
Food & Beverage - Distillery	Screw Feeder	√		√	
Food & Beverage - Dairy	Pump	√	√		
Food & Beverage - Dairy	Compressor		√	√	√
Food & Beverage - Dairy	Cream Separator			√	√
Food & Beverage - Edible Oil	Oil expeller (Kohlu)		√		√
Food & Beverage - Cold Storage	Screw Compressor		√	√	√
Food & Beverage - Cold Storage	Reciprocating Compressor		√	√	√
Food & Beverage - Cold Storage	Semi-hermetic Compressor		√		√
Food & Beverage - Cold Storage	Circulating Pump	√	√		
Food & Beverage - Cold Storage	Cooling tower fan	√	√		
Building - HVAC	Air Handling Unit	√	√		
Building - HVAC	Cooling tower fan	√	√		
Building - HVAC	Cooling tower pump	√	√		
Building - HVAC	Compressor	√	√		√
Building - HVAC	Condenser water pump	√	√		
Building - Utility	Booster Pump	√	√		√
Building - Basement Ventilation	Jet fan	√	√		
Building - Basement Ventilation	Fresh air fan	√	√		
Infra - Tunnel Ventilation	Tunnel Ventilation Fan	√	√		√

Segmentation & Applications

Segment	Application	xD1000	xD2000	xD3000	xD4000
Building - Utility	Submersible / Surface Pump	√	√		
Building - Fire Fighting	Jockey pump	√			
Building - Fire Fighting	Curtain pump	√	√		
Building - Fire Fighting	Main/fire fighting pump		√		
Building - Fire Fighting	Smoke extraction fan	√	√		√
Building	Elevator - Induction Motor			√	√
Building	Chiller		√		√
Retail chain	Smoke extraction fan	√			
Retail chain	Fresh air fan	√			
Healthcare - Pharma Process	Tablet coating machine			√	
Healthcare - Pharma Process	Reactor	√		√	
Healthcare - Pharma Process	Centrifuge		√		√
Healthcare - Pharma HVAC	AHU	√	√		
Healthcare - Pharma HVAC	Compressor		√		√
Healthcare - Pharma HVAC	Cooling tower fan	√	√		
Healthcare - Pharma HVAC	Cooling tower pump	√	√		
Healthcare - Pharma HVAC	Condenser water pump	√	√		
Metal, Mining & Minerals - Sponge Iron DRI	Kiln				√
Metal, Mining & Minerals - Sponge Iron DRI	Cooler drive				√
Metal, Mining & Minerals - Sponge Iron DRI	ID fan		√		√
Metal, Mining & Minerals - Sponge Iron DRI	Shell air fan		√		√
Metal, Mining & Minerals - Sponge Iron DRI	ABC fan		√		
Metal, Mining & Minerals - Sponge Iron DRI	Bag filter fan		√		√
Metal, Mining & Minerals - Sponge Iron DRI	Lobe compressor		√		√
Metal, Mining & Minerals - Sponge Iron DRI	RW Pump		√		
Metal, Mining & Minerals - Sponge Iron DRI	HW Pump		√		
Metal, Mining & Minerals - Sponge Iron DRI	CW Pump		√		
Metal, Mining & Minerals - Sponge Iron DRI	Lube oil pump		√		
Metal, Mining & Minerals - Wire Drawing	Capstan	√		√	
Metal, Mining & Minerals - Wire Drawing	Drum	√		√	√
Metal, Mining & Minerals - Wire Drawing	Tower wheel	√		√	√
Metal, Mining & Minerals - Material handling	Laddle crane				√
Metal, Mining & Minerals - Material handling	Overhead crane			√	√
Metal, Mining & Minerals - Material handling	Grab Crane				√
Metal	Tank Rotator	√		√	√
Metal	Press Machine			√	√
Paper	Pulper / Digestor				√
Paper	Pump		√		√
Paper	Fan		√		√
Paper	Compressor		√		√

Segmentation & Applications

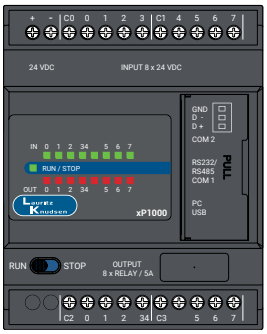
Segment	Application	xD1000	xD2000	xD3000	xD4000
OEM	Conveyor / Feeder	√		√	√
OEM	Pump - Grid	√	√	√	√
OEM	Fan	√	√		√
OEM	Compressor	√	√	√	√
OEM	Press Machine			√	√
OEM - SPM	Biscuit Making Machine	√		√	
OEM - SPM	Roti Making machine	√		√	
OEM - SPM	Khakhra making machines	√		√	
OEM - SPM	Jewellery making machine	√		√	
OEM - SPM	T-shirt printing machine	√		√	
OEM - SPM	Socks making machine	√		√	
OEM - SPM	Shoe making machine	√		√	
OEM - Textile	Air Texturizing Machine				√
OEM - Textile	Draw Texturizing Machine				√
OEM - Textile	Ring Frame	√		√	√
OEM - Textile	Speed Frame	√		√	
OEM - Textile	TFO Machine	√		√	
OEM - Textile	Godet Winder			√	
OEM - Textile	Flat Bed Printing			√	
OEM - Textile	Roll Polish Machine			√	
OEM - Textile	Stenter machine			√	√
OEM - Textile	Weaving machine	√		√	√
OEM - Material Handling	Cross Travel - Crane	√			
OEM - Material Handling	Long Travel - Crane	√			
OEM - Material Handling	Hoist - Crane			√	√
OEM - Building	Elevator - Induction Motor			√	√
OEM - Building	Elevator door	√			
OEM - Building	Construction lift			√	√
OEM - Building	Escalator			√	
OEM - Building	High Volume Low Speed fan			√	
OEM - Metal	Extruder			√	√
OEM - Plastic	Extruder	√		√	√
OEM - Plastic	Injection Moulding	√		√	√
OEM - Plastic	Surface Winder			√	√
OEM - Plastic	Centre Winder				√
OEM - Plastic	Web guide	√		√	
OEM - Wire Drawing	Capstan - Wire Drawing			√	√
OEM - Wire Drawing	Winder in torque limit mode			√	√

Segmentation & Applications

Segment	Application	xD1000	xD2000	xD3000	xD4000
OEM - Wire Drawing	Winder in torque control mode				√
OEM - Wire Drawing	Winder in PID mode with dancer			√	√
OEM - Material Handling	Bucket Elevator			√	√
OEM - Material Handling	Vertical Reciprocating Conveyor			√	√
OEM - Material Handling	Auto Storage & Retrieval System			√	√
OEM - Crusher	Primary Jaw Crusher				√
OEM - Crusher	Secondary Jaw Crusher				√
OEM - Crusher	Cone crusher				√
OEM - Crusher	VSI Crusher				√
OEM - Pump	Fire fighting pump	√	√		√
OEM - Pump	Jockey pump	√			
OEM - Pump	Vertical turbine pump		√		√
OEM - Pump	Horizontal Split Case pump		√		√
OEM - Pump	Submersible pump	√	√		√
OEM	Agitator	√		√	
OEM	Reactor	√		√	
OEM	Centrifuge		√	√	√

xP Series Programmable Logic Controller (PLC)

xP1000

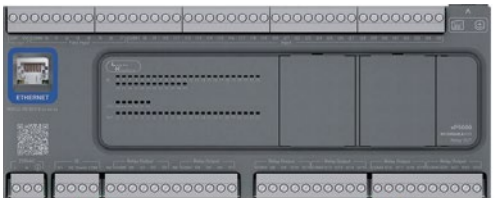


- 24 V DC power supply
- Supports Up to 112 IOs
- 2 Serial line port (1 RS485/ RS232)
- Expansion port, USB port
- 6 Expansion Modules
- RTC with Battery backup
- Analog Voltage / Current I/O of 0-10V / 4-20 mA
- Isolated inputs with sinking and sourcing capabilities

xP3000

- AC / DC power supply
- Available in different range of Built-in IOs (16,24,32,40)
- Supports upto 40 I/Os
- Serial line port (1 RS485)
- Micro-SD card slot and USB mini-B (Prog, Port)
- Relay outputs only
- 2 High speed counters, 2@60KHz

xP5000



- AC / DC power supply
- Different range of Built-in IOs 24,32,40,60) Supports Upto 196 I/Os
- Relay and transistor outputs
- Flexible I/Os, 2 cartridges, and up to 4 expansions
- Ethernet and Serial line ports
- Micro-SD card slot and USB port
- 2 High speed counters, 2@100KHz
- 2 Pulse Outputs at 100kHz*2

xT Series Human Machine Interface (HMI)

- Wide Range upto 15” in size
- Application Memory:
- Variable Area: SRAM 64KB
- Various Communication Interface: Ethernet /
- RS-232C / RS-422/485
- USB host and device
- SD memory card interface
- Certificates: CE, RoHS
- FLASH EPROM / Screen area: 64MB
- User font area 8 MB
- Logic program area: 132KB

Smart Comm - Overview

SMARTCOMM

Energy Analytics

Breaker Performance

Asset Management

Power Quality

Apps, Analytics & Services

PLC

HMI

RMU

Edge Control

AC Drive

Soft Starter

ACB

MCCB

Meter

PQR

iMMR

Connected Products

Service, Channel network and training capabilities.

Lauritz Knudsen is committed to providing a reliable and trustworthy service experience. Our nationwide network of over 100 service centers and 30+ branch offices ensures expert support throughout your product's life cycle, with fast, efficient responses and world-class customer satisfaction.

We also offer innovative Training Services at six dedicated training centers, empowering your workforce to maximize the performance and reliability of your equipment. Our comprehensive programs cover everything from product-specific operation and maintenance to advanced electrical and automation strategies. Expert trainers deliver engaging, practical training, upskilling your team for improved productivity and efficiency. Lauritz Knudsen empowers your workforce to maximize the efficiency and longevity of your investments.

NOTES

NOTES

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Product improvement is a continuous process. For the latest information and special application, please contact any of our offices listed here. Product photographs shown for representative purpose only.

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