Ingeteam

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Frequency Converters



INGEDRIVE



With over 40 years' experience, Ingeteam's drives cover a wide range of applications in sectors such as Marine, Metals, Mining, Oil & Gas, Water & Waste Water, Power Generation, and Test Benches. Ingeteam designs and manufactures MV and LV variable speed drive solutions for the most demanding applications in terms of control requirements and environmental conditions. With the latest design in power electronics and control, Ingeteam offers an extensive portfolio of drives.



Introduction

INGEDRIVE[™] is a family of low- and medium-voltage modular AC drives designed for demanding single-motor or multi-motor applications handling and controlling synchronous, induction, and permanent magnet motors. These drives are suitable for four-quadrant operation, driving and braking in both rotational directions.

INGEDRIVE[™] is designed to be a highly-efficient drive which significantly reduces energy consumption. Its modular design enables it to cover a wide range of powers and voltages while its intuitive structure makes it easy to use and maintain.

Years of experience have made it possible to incorporate two- and three-level advanced vector control into lowand medium-voltage rectifiers and inverters, always using latest generation semiconductors. The powerful CCU (Converter Control Unit) communicates with power stacks via optic fibre. The result is a compact, flexible, safe, and user-friendly solution.

INGEDRIVE[™] is available with power ratings up to 36 MVA, from 400V to 690V in low voltage and 3.3 kV to 6.9 kV in medium voltage, offering great performance, robustness, reliability, and long life expectancy.







Main Features

Wide range of powers and voltages: the use of different types of semiconductor for each range, as well as appropriate topologies makes it possible to provide the best solution for almost any application.

Modular design: the modular design upon which the INGEDRIVE[™] family is based makes it possible to design a "Custom-Made Configuration" for each client and application.

Converter architecture: the control system is based on two elements - the CCU (Converter Control Unit) and the PMM (Power Management Module) associated to each of the BPMs (Basic Power Modules) combined with which a wide range of configurations can be achieved. Furthermore, this hardware facilitates easy expansion of I/O capacity and communication modules.

Flexibility: this is achieved thanks to the combination of basic power modules (BPMs) and control modules, which allow the rectifier to choose from DFE (6, 12 or 24 pulses) or AFE (Active Front End) topologies and different inverter modules for single-or multi-drive solutions according to client requirements.

Intuitive troubleshooting: The system includes the "Web Server" functional feature with no additional parameterising program requirements. This enables remote access to converters and permits the analysis of potential failures, thus minimising repair times whilst maximizing drive availability.

High quality: the parts and elements used in the converter are selected according to quality and life expectancy improvement concepts, thus extending the availability and life expectancy of the drive system as a whole.

Safety: INGEDRIVE[™] is based in our Safety Drive Cabinet (SDC) system, which is a system guaranteeing safe, "0" voltage access to converters both in low and medium voltage. Other safety features also include flame-retardant and halogen-free properties, wiring and cable ducts.

Standards: the entire INGEDRIVE[™] converter family complies with IEC international standards for low and medium voltage converters. The high quality of our equipment enables us to attain certification from the most renowned classification bodies, such as Lloyd's Register, DNV, ABS and BV.

Excellent performance: the high performance of INGEDRIVE[™] families makes it possible to achieve energy savings and improvements in efficiency.



Topologies and Configurations

INGEDRIVE[™] can be applied to different sectors and custom made to specific requirements. It can control motors with one or several windings and cater to the needs of redundant, single-motor and multi-motor solutions. Parallel connection of several inverters to the same motor is feasible allowing higher converter output. It is also possible connect several AFE rectifiers in parallel so that more power can be handled.



Control Features

applications).

themselves through the DC bus (i.e. tension reels on reversing cold mills in the metal industry and test bench

Using the most advanced Digital Signal Processor Techniques, INGEDRIVE™ offers high-power and highly-reliable driving motors with smooth torque control throughout the whole speed range, using the latest advanced control techniques.

Its powerful CCU has two microprocessors: one is designed to perform all functions related to controlling the converter and the other is a PLC (in accordance with IEC 61131) for performing all the drive system's logic functions. The control code is designed to be integrated into standard simulation platforms to reproduce the real control behaviour in applications.



Metals Mill stands, winders, pumps, fans,

different communication modules.

- magnet and induction machine control.

Furthermore, the control system as a whole can handle and adapt to a wide variety of applications and configuration options. For example, motors can be controlled with or without speed sensors (with a patented encoderless control system), as well as redundant encoder

Ingeteam's experience in the marine, industry and energy sectors has enabled it to develop key functional features for all types of application, including black-out prevention, power mode control, flying start applications, voltage ride through, energy saving and load sharing.



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The CCU communicates with the various BPMs (rectifiers and inverters) via an optic fibre link called PMM Link, thus electrically isolating the drive power side from control side and avoiding potential ground noise. It is designed for both basic solutions and highly-complex ones by expanding the number of I/Os locally and remotely and with the option of adding

Converter control is carried out on standard hardware and software platforms. The same control hardware and software permits the following functional features:

1 Control of the whole medium and low voltage converter range with two, three and multilevel topologies, using the same control components.

2 Modular solution for different multi-drive configurations.

3 Permits both independent excitation synchronous machine control and permanent

Ingedrive Web Server

INGEDRIVE™ is easy to use via the operator panel and PC interface's powerful user-friendly software, which supports monitoring, configuration, diagnostics, control, data recording, and commissioning either locally or remotely when necessary. The system runs as a web application with no need for any additional software or license on your PC. Instead, once connected via the Ethernet link, the drive will supply your PC with the necessary software. Different password levels are available for data and parameter protection and data-program upload/download procedures are straightforward

Communication Buses

The system offers RS-485 and Ethernet as basic communication modules. Any communication protocol based on these communications lines, such as Profibus-DP, Modbus TCP, Modbus RTU, CAN, etc., are available on request.





Protection

Drive Protection: Overcurrent, earth fault, output short-circuit, overload, overspeed, over-/under-voltage, overheating, semiconductor fault, cooling system fault, imbalance between motor phases, disconnected rectifier or inverter phases, water leakage, etc.

The INGEDRIVE™ family offers converters cooled by air or by water (fresh water or sea water). Our water-cooled equipment is manufactured in stainless steel. Easy maintenance and reliable materials such as guick connectors, three-way valves for regulating the incoming temperature, redundant deionising systems for medium-voltage drives (for MV500 family based in IGCTs) and redundant pumps with valves in order to isolate the primary from secondary are installed. All parameters such as pressure, temperature, leakage and conductivity are constantly monitored.

Design tips

follows:

- dust short-circuits. Individual industrial processors for motor control (DSP) and for drive system control (PLC in accordance with IEC 61131).
- Tin-plated copper busbars. Stainless steel pipes.
- Anti-condensation heaters to prevent the appearance of dangerous drops of moisture.

Parts with voltage in the equipment can be safely accessed thanks to the SDC safety system. In the medium-voltage equipment this consists of a key interlock system and earthing switches. In the low-voltage range it is based on door interlocks, ensuring that the doors cannot be opened when there is voltage in the equipment.

Quality

Water and Waste Waters

Intensive Testing In addition to several quality testing stages during parts production, all finished drives are tested up to full current and voltage before being shipped.

Working Life Designed for long working life expectancy under the toughest environmental conditions and the most demanding dynamic requirements, Ingedrive converters have a proven track record of safe and reliable projects all around the world in the Industry, Marine and Energy sectors.



Cooling Systems

Some features that demonstrate the quality of INGEDRIVE[™] converters are as

- Polypropylene power capacitors as standard, providing longer life expectancy. Large harmonic filters plus higher semiconductor switching frequency,
- further minimizing THD content.
- Electronic board varnishing, minimizing potentially dangerous conductive
- Electric cabinets from leading worldwide manufacturers.

Maintenance and Safety

Our range of INGEDRIVE[™] converters has been specifically designed to minimise and facilitate maintenance tasks, not only in terms of fault detection and analysis but also through hardware design thanks to removable power modules.



Product Range

INGEDRIVE[™] offers different configuration options depending on your needs, such as non-regenerative systems, 6, 12, or 24-pulse DFE or AFE regenerative systems, as follows:

- LV400 (low-voltage AC drive based on IGBTs. Air and water cooled) 6P DFE, 12P DFE, AFE as standard.
- MV100 (medium-voltage AC drive, based on HV-IGBT modules. Air and water cooled) 12P DFE, 24P DFE, AFE as standard.
- **MV500** (medium voltage AC drive, based on IGCTs and water cooled) 12P DFE, 24P DFE, AFE as standard.
- MV700 (medium voltage AC drive, based on HV-IGBT modules. Air cooled) 24P DFE as standard.

N.B.: The AFE topology makes it possible to work with a unit power factor with lowest harmonics throughout the application's entire functional range. A further advantage in AFE systems is the regeneration of the motor's kinetic energy during braking, resulting in a highly-efficient configuration.











air cooled, low-voltage



AFE Topology 380V-480V Air Cool									
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height (4)	Weight _{Kg}		
480	355	300	337	LV4F-24-271AA-348+Z	427	2400 600 2360	850		
480	532	450	506	LV4F-26-401AA-348+Z	640	2400 600 2360	850		
480	698	590	663	LV4F-28-391AA-348+Z	839	2400 600 2360	850		
480	840	710	798	LV4F-31-011AA-348+Z	1010	3800 600 2360	1400		
480	1064	900	1011	LV4F-31-281AA-348+Z	1280	3800 600 2360	1400		
480	1301	1100	1236	LV4F-31-571AA-348+Z	1565	3800 600 2360	1400		

12 Pulse DFE Topology

Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimen Width Depth	sions (3) Height (4)	Weight _{Kg}
440	355	300	337	LV4D2-24-661AA-344+Z	466	1400 600	2360	550
440	532	450	506	LV4D2-26-981AA-344+Z	698	1400 600	2360	550
440	698	590	663	LV4D2-29-161AA-344+Z	916	1400 600	2360	550
440	840	710	798	LV4D2-31-101AA-344+Z	1102	2200 600	2360	950
440	1064	900	1011	LV4D2-31-401AA-344+Z	1397	2200 600	2360	950
440	1301	1100	1236	LV4D2-31-711AA-348+Z	1707	2200 600	2360	950

6 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height (4)	Weight Kg
380	343	290	326	LV4D1-25-211AA-338+Z	521	1400 600 2360	600
380	532	450	506	LV4D1-28-091AA-338+Z	809	1400 600 2360	600
380	662	560	629	LV4D1-31-011AA-338+Z	1006	1400 600 2360	600
380	840	710	798	LV4D1-31-281AA-338+Z	1276	2000 600 2360	1000
380	1064	900	1011	LV4D1-31-621AA-338+Z	1617	2000 600 2360	1000

AFE Top	AFE Topology 600V-690V Air Co									
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power ⁽²⁾ Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions ⁽³⁾ Width Depth Height ⁽⁴⁾	Weight _{Kg}			
690	414	350	393	LV4F-23-461AA-369+Z	346	2400 600 2360	850			
690	532	450	506	LV4F-24-451AA-369+Z	445	2400 600 2360	850			
690	662	560	629	LV4F-25-541AA-369+Z	554	2400 600 2360	850			
690	804	680	764	LV4F-26-731AA-369+Z	673	2400 600 2360	850			
690	1064	900	1011	LV4F-28-911AA-369+Z	891	3800 600 2360	1400			
690	1301	1100	1236	LV4F-31-091AA-369+Z	1089	3800 600 2360	1400			
690	1561	1320	1483	LV4F-31-311AA-369+Z	1306	3800 600 2360	1400			

12 Pulse DFE Topology

Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimer Width Depth	1sions (3) Height (4)	Weight _{Kg}
660	414	350	393	LV4D2-23-621AA-366+Z	362	1400 600	2360	550
660	532	450	506	LV4D2-24-661AA-366+Z	466	1400 600	2360	550
660	662	560	629	LV4D2-25-791AA-366+Z	579	1400 600	2360	550
660	804	680	764	LV4D2-27-041AA-366+Z	704	1400 600	2360	550
660	1064	900	1011	LV4D2-29-311AA-366+Z	931	2200 600	2360	950
660	1301	1100	1236	LV4D2-31-141AA-366+Z	1138	2200 600	2360	950
660	1561	1320	1483	LV4D2-31-371AA-366+Z	1366	2200 600	2360	950

6 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height (4)	Weight Kg
600	402	340	382	LV4D1-23-871AA-360+Z	387	1400 600 2360	600
600	532	450	506	LV4D1-25-121AA-360+Z	512	1400 600 2360	600
600	662	560	629	LV4D1-26-371AA-360+Z	637	1400 600 2360	600
600	769	650	730	LV4D1-27-401AA-360+Z	740	1400 600 2360	600
600	1005	850	955	LV4D1-29-671AA-360+Z	967	2000 600 2360	1000
600	1301	1100	1236	LV4D1-31-251AA-360+Z	1252	2000 600 2360	1000

Shaft power is calculated using asynchronous motor data (η=0.95, cosφ=0.89)
 Shaft power is calculated using synchronous motor data (η=0.95, cosφ=1)
 Excitation cabinet for synchronous motor not included
 Fans included

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Ingeteam

water-cooled, low-voltage



AFE Topology 380V-480V Water Cooled										
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight Kg			
480	828	700	787	LV4F-29-961WA-348+Z	996	2400 600 2160	1800			
480	1183	1000	1124	LV4F-31-421WA-348+Z	1423	2400 600 2160	1800			
480	1419	1200	1348	LV4F-31-711WA-348+Z	1707	2400 1200 2160	3600			
						4200 600 2160	3400			
480	1774	1500	1685	LV4F-32-131WA-348+Z	2134	2400 1200 2160	3600			
						4200 600 2160	3400			
480	2247	1900	2135	LV4F-32-701WA-348+Z	2703	2400 1200 2160	3600			
						4200 600 2160	3400			
480	3312	2800	3146	LV4F-33-981WA-348+Z	3983	3400 1200 2160	5100			
480	4258	3600	4045	LV4F-35-121WA-348+Z	5121	4200 1200 2160	6800			

12 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet D Width	Dimen Depth	sions (3) Height	Weight _{Kg}
440	662	560	629	LV4D2-28-691WA-344+Z	869	2000	600	2160	1400
440	745	630	708	LV4D2-29-781WA-344+Z	978	2000	600	2160	1400
440	840	710	798	LV4D2-31-101WA-344+Z	1102	2000	600	2160	1400
440	1064	900	1011	LV4D2-31-401WA-344+Z	1397	2000	600	2160	1400
440	1419	1200	1348	LV4D2-31-861WA-344+Z	1862	3200	600	2160	2600
440	1656	1400	1573	LV4D2-32-171WA-344+Z	2173	3200	600	2160	2600
440	2011	1700	1910	LV4D2-32-641WA-344+Z	2638	3200	600	2160	2600
440	2957	2500	2809	LV4D3-33-881WA-344+Z	3880	2600	1200	2160	3900
440	3903	3300	3708	LV4D4-35-121WA-344+Z	5121	3200	1200	2160	5200

6 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight _{Kg}
380	662	560	629	LV4D1-31-011WA-338+Z	1006	2000 600 2160	1500
380	745	630	708	LV4D1-31-131WA-338+Z	1132	2000 600 2160	1500
380	840	710	798	LV4D1-31-281WA-338+Z	1276	2000 600 2160	1500
380	946	800	899	LV4D1-31-441WA-338+Z	1438	2000 600 2160	1500
380	1419	1200	1348	LV4D1-32-161WA-338+Z	2156	3000 600 2160	2800
380	1774	1500	1685	LV4D1-32-701WA-338+Z	2695	3000 600 2160	2800
380	2602	2200	2472	LV4D1-33-951WA-338+Z	3953	2400 1200 2160	4200
380	3312	2800	3146	LV4D1-35-031WA-344+Z	5032	3000 1200 2160	5600

LV 400

AFE Top	AFE Topology 600V-690V Water Coole										
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimer Width Depth	1sions (3) Height	Weight _{Kg}			
690	887	750	843	LV4F-27-421WA-369+Z	742	2400 600	2160	1800			
690	1301	1100	1236	LV4F-31-091WA-369+Z	1089	2400 600	2160	1800			
690	1656	1400	1573	LV4F-31-391WA-369+Z	1385	2400 600	2160	2000			
690	1892	1600	1798	LV4F-31-581WA-369+Z	1583	2400 600	2160	2000			
690	2247	1900	2135	LV4F-31-881WA-369+Z	1880	2400 1200	2160	3600			
						4200 600	2160	3400			
690	2602	2200	2472	LV4F-32-181WA-369+Z	2177	2400 1200	2160	3600			
						4200 600	2160	3400			
690	3075	2600	2921	LV4F-32-571WA-369+Z	2573	2400 1200	2160	4000			
						4200 600	2160	3800			
690	3430	2900	3258	LV4F-32-871WA-369+Z	2870	2400 1200	2160	4000			
						4200 600	2160	3800			
690	3666	3100	3483	LV4F-33-071WA-369+Z	3068	3600 1200	2160	5100			
690	4613	3900	4382	LV4F-33-861WA-369+Z	3860	3600 1200	2160	5700			
690	5086	4300	4831	LV4F-34-261WA-369+Z	4255	3600 1200	2160	5700			
690	5914	5000	5618	LV4F-34-951WA-369+Z	4948	4200 1200	2160	7600			
690	6505	5500	6180	LV4F-35-441WA-369+Z	5443	4200 1200	2160	7600			

12 Pulse DFE Topology

Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions ⁽³⁾ Width Depth Height	Weight _{Kg}
660	745	630	708	LV4D2-26-521WA-366+Z	652	2000 600 2160	1400
660	828	700	787	LV4D2-27-241WA-366+Z	724	2000 600 2160	1400
660	1064	900	1011	LV4D2-29-311WA-366+Z	931	2000 600 2160	1400
660	1301	1100	1236	LV4D2-31-141WA-366+Z	1138	2000 600 2160	1400
660	1656	1400	1573	LV4D2-31-451WA-366+Z	1448	2000 600 2160	1600
660	1774	1500	1685	LV4D2-31-551WA-366+Z	1552	2000 600 2160	1600
660	2011	1700	1910	LV4D2-31-761WA-366+Z	1759	3200 600 2160	2600
660	2484	2100	2360	LV4D2-32-171WA-366+Z	2173	3200 600 2160	2600
660	3193	2700	3034	LV4D2-32-791WA-366+Z	2793	3200 600 2160	3000
660	3548	3000	3371	LV4D3-33-101WA-366+Z	3104	2600 1200 2160	3900
660	4021	3400	3820	LV4D3-33-521WA-366+Z	3518	2600 1200 2160	4500
660	4731	4000	4494	LV4D3-34-141WA-366+Z	4138	2600 1200 2160	4500
660	5441	4600	5169	LV4D4-34-761WA-366+Z	4759	3200 1200 2160	6000
660	6268	5300	5955	LV4D4-35-481WA-366+Z	5483	3200 1200 2160	6000

6 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight _{Kg}
600	745	630	708	LV4D1-27-171WA-360+Z	711	2000 600 2160	1500
600	840	710	798	LV4D1-28-081WA-360+Z	808	2000 600 2160	1500
600	1064	900	1011	LV4D1-31-021WA-360+Z	1024	2000 600 2160	1500
600	1360	1150	1292	LV4D1-31-311WA-360+Z	1309	2000 600 2160	1700
600	1656	1400	1573	LV4D1-31-591WA-360+Z	1593	2000 600 2160	1700
600	2247	1900	2135	LV4D1-32-161WA-360+Z	2162	3000 600 2160	2800
600	2957	2500	2809	LV4D1-32-851WA-360+Z	2845	3000 600 2160	3200
600	3193	2700	3034	LV4D1-33-071WA-360+Z	3073	2400 1200 2160	4200
600	4140	3500	3933	LV4D1-33-981WA-360+Z	3983	3000 1200 2160	5600
600	4376	3700	4157	LV4D1-34-211WA-360+Z	4211	2400 1200 2160	4800
600	5677	4800	5393	LV4D1-35-461WA-360+Z	5463	3000 1200 2160	6400

(1) Shaft power is calculated using asynchronous motor data (η =0.95, cos φ =0.89) (3) Excitation cabinet for synchronous motor not included (2) Shaft power is calculated using synchronous motor data (η =0.95, cos φ =1)

INGEDRIVE

air or water-cooled, medium-voltage

AFE Topology Water Co							
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions ⁽³⁾ Width Depth Height	Weight _{Kg}
3300	3454	3000	3333	MV1F-26-041WA-433+Z	604	2200 1400 2360	2800
3300	6218	5400	6000	MV1F-31-091WA-433+Z	1088	3800 1400 2360	4500
3300	8981	7800	8667	MV1F-31-571WA-433+Z	1571	5600 1400 2360	5400
3300	11744	10200	11333	MV1F-32-061WA-433+Z	2055	7600 1400 2360	6400
4160	3221	2800	3111	MV1F-24-471WA-442+Z	447	2200 1400 2360	2800
4160	5988	5200	5778	MV1F-28-311WA-442+Z	831	3800 1400 2360	4500
4160	8747	7600	8444	MV1F-31-211WA-442+Z	1214	5600 1400 2360	5400
4160	11514	10000	11111	MV1F-31-601WA-442+Z	1598	7600 1400 2360	6400

12 Pulse DFE Topology

Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power ⁽²⁾ Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight _{Kg}
3150	3454	3000	3333	MV1D2-26-331WA-432+Z	633	2000 1400 2360	2500
3150	6220	5400	6000	MV1D2-31-141WA-432+Z	1140	2600 1400 2360	3300
3150	8981	7800	8667	MV1D2-31-651WA-432+Z	1646	4000 1400 2360	4100
3150	11741	10200	11333	MV1D2-32-151WA-432+Z	2152	4000 1400 2360	4600
4160	3221	2800	3111	MV1D2-24-471WA-442+Z	447	2000 1400 2360	2500
4160	5988	5200	5778	MV1D2-28-311WA-442+Z	831	2600 1400 2360	3300
4160	8747	7600	8444	MV1D2-31-211WA-442+Z	1214	4000 1400 2360	4100
4160	11514	10000	11111	MV1D2-31-601WA-442+Z	1598	4000 1400 2360	4600



AFE Topology Air							Cooled		
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet C Width)imen Depth	Height ⁽⁴⁾	Weight _{Kg}
3300	1151	1000	1110	MV1F-22-011AA-433+Z	201	2000	1200	2750	2400
3300	1554	1350	1499	MV1F-22-721AA-433+Z	272	2000	1200	2750	2400
3300	1957	1700	1888	MV1F-23-421AA-433+Z	342	2000	1200	2750	2400
3300	2417	2100	2332	MV1F-24-231AA-433+Z	423	4000	1200	2750	4000
3300	2993	2600	2888	MV1F-25-241AA-433+Z	524	4000	1200	2750	4000
3300	3569	3100	3444	MV1F-26-241AA-433+Z	624	4000	1200	2750	4000
4160	1151	1000	1110	MV1F-21-601AA-442+Z	160	2000	1200	2750	2400
4160	1496	1300	1443	MV1F-22-081AA-442+Z	208	2000	1200	2750	2400
4160	1842	1600	1777	MV1F-22-561AA-442+Z	256	2000	1200	2750	2400
4160	2302	2000	2221	MV1F-23-201AA-442+Z	320	4000	1200	2750	4000
4160	2993	2600	2888	MV1F-24-151AA-442+Z	415	4000	1200	2750	4000
4160	3684	3200	3555	MV1F-25-111AA-442+Z	511	4000	1200	2750	4000

12 Pulse DFE Topology								
Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dime Width Dept	h Height ⁽³⁾	Weight _{Kg}
3150	1093	950	1054	MV1D2-22-001AA-432+Z	200	2000 120) 2750	2150
3150	1496	1300	1443	MV1D2-22-741AA-432+Z	274	2000 120) 2750	2150
3150	1899	1650	1832	MV1D2-23-481AA-432+Z	348	2000 120) 2750	2150
3150	2302	2000	2221	MV1D2-24-221AA-432+Z	422	4000 120) 2750	3000
3150	2878	2500	2777	MV1D2-25-281AA-432+Z	528	4000 120) 2750	3000
3150	3454	3000	3333	MV1D2-26-331AA-432+Z	633	4000 120) 2750	3000
4160	1151	1000	1110	MV1D2-21-601AA-442+Z	160	2000 120) 2750	2150
4160	1496	1300	1443	MV1D2-22-081AA-442+Z	208	2000 120) 2750	2150
4160	1842	1600	1777	MV1D2-22-561AA-442+Z	256	2000 120	2750	2150
4160	2302	2000	2221	MV1D2-23-201AA-442+Z	320	4000 120) 2750	3000
4160	2993	2600	2888	MV1D2-24-151AA-432+Z	415	4000 120) 2750	3000
4160	3684	3200	3555	MV1D2-25-111AA-442+Z	511	4000 120) 2750	3000

Shaft power is calculated using asynchronous motor data (η=0.965, cosφ=0.9)
 Shaft power is calculated using synchronous motor data (η=0.965, cosφ=1)
 Excitation cabinet for synchronous motor not included
 Fans included



MV 100

Ingeteam



MV 500

AFE Topology Water C							Cooled
Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight _{Kg}
3150	7000	6000	6755	MV5F-31-281WA-432+Z	1280	6000 1200 2360	6200
3150	9000	7800	8685	MV5F-31-651WA-432+Z	1650	6000 1200 2360	6200
3150	14000	12100	13510	MV5F-32-561WA-432+Z	2 x 1280	12000 1200 2360	12400
3150	18000	15600	17370	MV5F-43-301WA-432+Z	2 x 1650	12000 1200 2360	12400
3150	21000	18200	20265	MV5F-33-841WA-432+Z	3 x 1280	18000 1200 2360	18600
3150	27000	23400	26055	MV5F-34-951WA-432+Z	3 x 1650	18000 1200 2360	18600
3150	36000	31200	34740	MV5F-36-601WA-432+Z	4 x 1650	24000 1200 2360	24800

IZ PUIS	12 Puise DFE Topology								
Motor Voltage ∨	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height	Weight _{Kg}		
3150	7000	6000	6755	MV5D2-31-281WA-432+Z	1280	5000 1200 2360	5400		
3150	9000	7800	8685	MV5D2-31-651WA-432+Z	1650	5000 1200 2360	5400		
3150	14000	12100	13510	MV5D2-32-561WA-432+Z	2 x 1280	10000 1200 2360	10800		
3150	18000	15600	17370	MV5D2-43-301WA-432+Z	2 x 1650	10000 1200 2360	10800		
3150	21000	18200	20265	MV5D2-33-841WA-432+Z	3 x 1280	15000 1200 2360	16200		
3150	27000	23400	26055	MV5D2-34-951WA-432+Z	3 x 1650	15000 1200 2360	16200		
3150	36000	31200	34740	MV5D2-36-601WA-432+Z	4 x 1650	20000 1200 2360	21600		

(1) Shaft power is calculated using asynchronous motor data (η =0.965, cos φ =0.9) (2) Shaft power is calculated using synchronous motor data (η =0.965, cos φ =1) (3) Excitation cabinet for synchronous motor not included

	MV	700		
ir-cooled	modium_volta	αA		

24 Pulse DFE Topology - Quadratic Loads Air							Cooled
Motor Voltage V	Power kVA	Shaft Power (1) Asynchronous kW	Shaft Power (2) Synchronous kW	Type Code	Rated Output Current (A)	Cabinet Dimensions (3) Width Depth Height (4)	Weight _{Kg}
6600	978	850	943	MV7D4-20-871AA-466+Z	87	2800 1400 2750	4500
6600	1957	1700	1888	MV7D4-21-711AA-466+Z	171	3600 1600 2750	6800
6600	2878	2500	2777	MV7D4-22-521AA-466+Z	252	4400 1600 2750	8500
6600	3914	3400	3777	MV7D4-23-421AA-466+Z	342	5200 1600 2750	9900

(1) Shaft power is calculated using asynchronous motor data (η =0.965, cos φ =0.9) (2) Shaft power is calculated using synchronous motor data (η =0.965, cos φ =1) (3) Transformer included. Excitation cabinet for synchronous motor not included (4) Fans included







Environment and Health & Safety Management

Ingeteam's strategy includes a permanent focus on achieving excellence in the quality that we provide and in process management, whilst constantly respecting the environment and considering safety as a priority. Hence, we are actively involved in the following:

- Developing the EFQM model as an internal management reference.
- Improving the satisfaction of our internal and external clients and suppliers.
 Focusing on continuous improvement through the development of our certified and integrated management systems: 9001 (Quality Management), 14001 (5)
- 14001 (Environmental Management) and OHSAS 18001 (Occupational Health & Safety)
- Strict compliance with client requirements, environmental legislation and occupational hazard prevention.

Services

Ingeteam's priorities include customer service and availability. These strategic values are reflected in diverse actions resulting in significant added value. Our customer service consists of two stages:

Pre-Sales Service:

As an equipment manufacturer, Ingeteam prides itself on immediate customer service and personalised support. Some of the ways we achieve this include the following:

- Liaising with and advising our clients in choosing the solution that best suits their requirements.
- Custom-made hardware/software developments, working in conjunction
- with the client from the start.
- Engineering services.
- Sales support for partners, integrators, etc.

After-Sales Service:

As part of our commitment to customer service Ingeteam offers:

- Supervision, installation and commissioning.
- Direct customer support.
- · Training courses.
- · Technical assistance

All of the above processes and commitments are part of our 360° Customer Relationship Service and cover all requirements that arise throughout the process of deploying our products.

Ingeteam Capability

At Ingeteam we have state-of-the-art facilities and highly-qualified staff to cover all our clients' needs. This is demonstrated by our high-power electronics research laboratory and electric machine research laboratory.

These laboratories validate the latest technologies in high power electronics and electric machines for different sectors.

High Power Electronics Experimental Research Laboratory

The High Power Electronics Laboratory, home to leading international researchers, focuses on studying medium and high power converters through experiments involving inductive loads, with power being taken from the grid only to compensate system loss.

Electric Machine Experimental Laboratory

This laboratory focuses on the mobility of large machinery, in addition to all infrastructure required for experimental research and type tests on large electric machines running on low and medium voltages, with different voltage ranges and powers up to 43 MW active power in back-to-back configuration.







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