



MV7000

Entering a new dimension
for reliability and performance
in medium-voltage AC drives

With over a century of recognized excellence in electrotechnics and power electronics, the Convertteam group is a leading worldwide engineering company in power conversion. We offer you a broad range of solutions that harness the latest technology to match your individual requirements.

Designed to better serve your needs

The new Convertteam range of high performance medium voltage drives, **MV7000**, brings innovation to the field of large drives technology. It gives an effective answer to your increasing demand for outstanding performance, excellent reliability and improved compactness.

Using proven technology from Convertteam’s extensive range of drives, the **MV7000** converters offer compact and efficient design that perfectly fit in with the more dynamic and high performance demands:

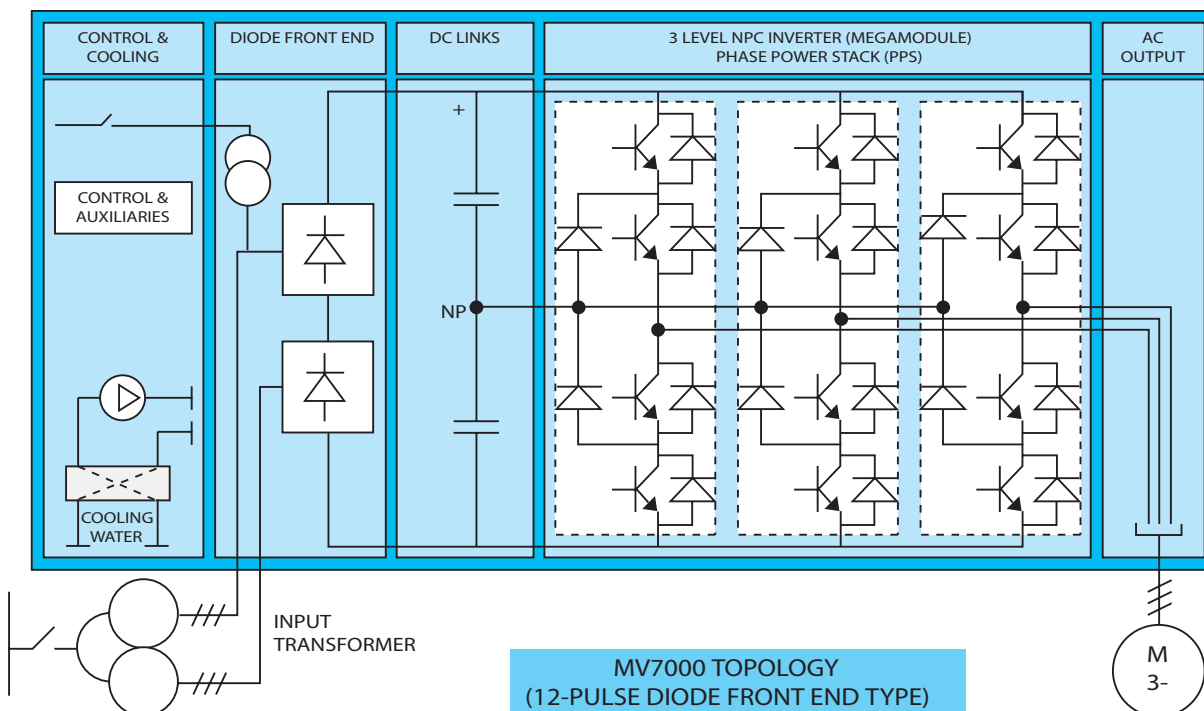
- general applications: fans, compressors, pumps, mixers, extruders, wind turbines, wind and water tunnels, mine winders, conveyors, test benches
- high speed drives for oil and gas: high speed compressors
- drives for metals industry: section mills, hot strip mills, cold rolling mills
- drives for marine, naval and offshore applications.

The **MV7000** drives are designed to meet your expectations in terms of:

- performance with high efficiency above 99%
- reliability with press-pack IGBT technology, fuseless protection and low component count
- compactness, modularity and front access
- low operating costs.

In addition, they offer you additional benefits such as:

- quality of machine supply (high-grade torque, no machine derating, low noise and vibration level)
- minimum network interference (low harmonics, high power factor)
- ease of use (advanced control features, function block diagram, operating panel, remote PC)
- ease of maintenance (monitoring system, all front access, modular construction).



Output voltage kV	Reference	Output power MW	Output power MVA	Output current A	Width (mm)	Depth (mm)	Weight (kg)
3.3	MV7303	3	3.75	660	2800	800	2800
	MV7304	4.2	5.25	900	4200	1000	4800
	MV7306	6	7.5	1350	4200	1000	5000
	MV7308	8.4	10.5	1800	4200	1000	5400
	MV7312	12	15	2700	5000	2000	10000
	MV7316	16.8	21	3600	5000	2000	10800
6.6	MV7608	8.4	10.5	900	8800	1200	12000
	MV7612	12	15	1350	9600	1200	12500
	MV7616	16.8	21	1800	9600	1200	13300
	MV7624	24	30	2700	9600	2400	17000
	MV7632	33.6	42	3600	9600	2400	26600

Technical data, dimensions and weights given for basic standalone drives are subject to change without notice. Please contact Convertteam for details and delivery times.

A complete range of high performance drives

MV7000 drives cover the medium and high power range up to 33MW at two motor voltages 3.3 and 6.6kV at present, and 4.16kV in the near future.

The drives are water cooled PWM (pulse width modulation) voltage source inverters. They can feed both induction and synchronous machines with high performance vector control, in all speed ranges from marine low speed propulsion drives to high speed compressor drives without a gearbox. The MV7000 drive is modular and features different options, such as regenerative front ends, dynamic braking choppers, connection to a DC link, so that the drive can be configured to suit virtually all applications.

Advanced technology to support advanced requirements

Low harmonics without costly equipment

MV7000 features as standard a 12-pulse (or 24-pulse) diode front end, fed by a 2 (or 4) phase-displaced secondary windings transformer. The harmonics injected into the network are very low. The drive complies with international standards for voltage and current harmonic distortion, without any harmonic filters nor var-compensation equipment. The drive continues to operate through network drops without tripping. When required, electrical braking is available by an optional dynamic braking chopper connected to a resistor.

Energy optimization

For reversing applications also with frequent braking, a PWM active front end ensures the regeneration of the energy to the network. Additionally, the active front end gives unity power factor and a sinusoidal input with negligible harmonics.

For multiple drives applications with both motoring and regenerating motors (typically tension reels in the metal industry), a common DC link fed by a single active front end is perfectly suited for reducing overall equipment cost and footprint and energy optimization.

Soft start-up without grid disturbance (patented)

MV7000 provides low inrush current when energizing the drive. Pre-magnetizing of the input transformer is achieved by means of auxiliary transformer. Closing of main circuit breaker is completed without incoming bus disturbances.

Greater efficiency and compatibility with all motors

The inverter features the new "Press-Pack" IGBT power semiconductors, which enhances the power capabilities of the MV7000 in the larger sizes. For the higher powered range these devices give considerably increased power, less losses and improved reliability due to lower component count and rugged design. As a result, the MV7000 is at the top level for reliability, efficiency and power density. The PWM 3-level NPC inverter provides excellent output waveform, and subsequently very low current THD (total harmonic distortion).

This results in negligible de-rating of the driven machine and negligible amplitude of torque pulsation at the shaft, a huge benefit for critical process applications.

The drive can supply either new machines with standard insulation or machines in retrofit applications.

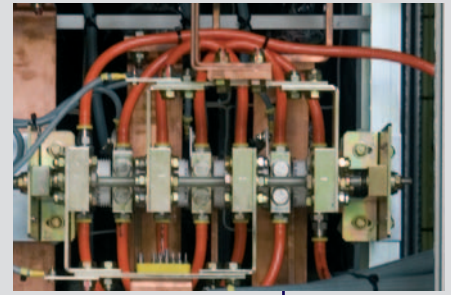
The PWM control strategy used by the MV7000 means high quality performance, with adjustable PWM patterns and frequency at every operating point, providing a wide range of flexibility for:

- low commutation losses
- low motor THD
- operating at very low frequency, with full torque
- operation at high frequency, up to 300 Hz.

A look inside...

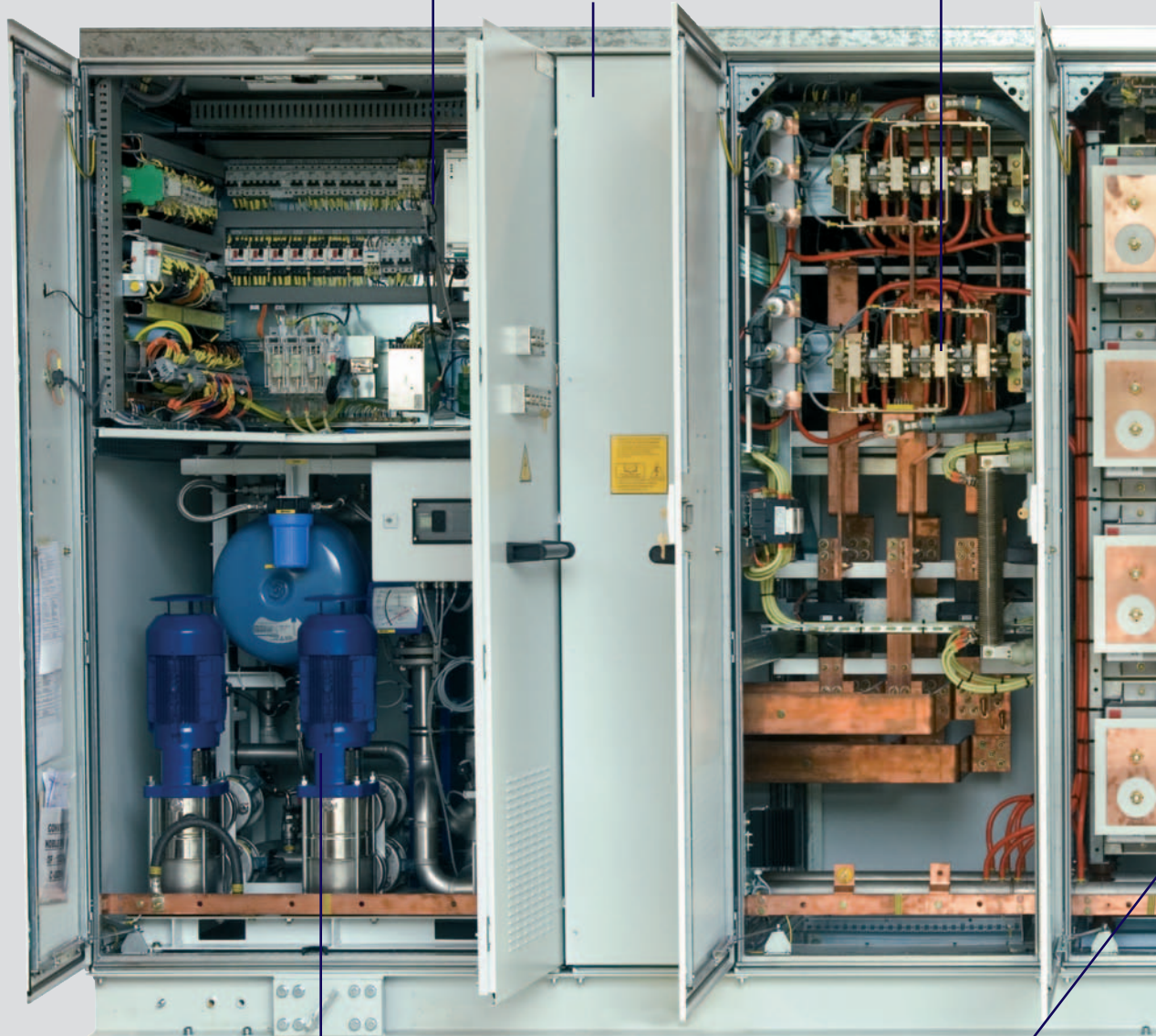


Power Electronic Controller PEC



Diode Front End Diode Stack

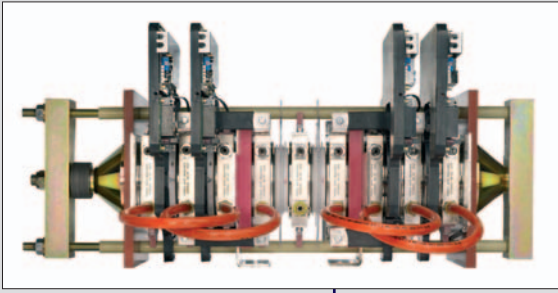
«Optional» Top cable entry



**Cooling unit
«Optional» standby pump shown**

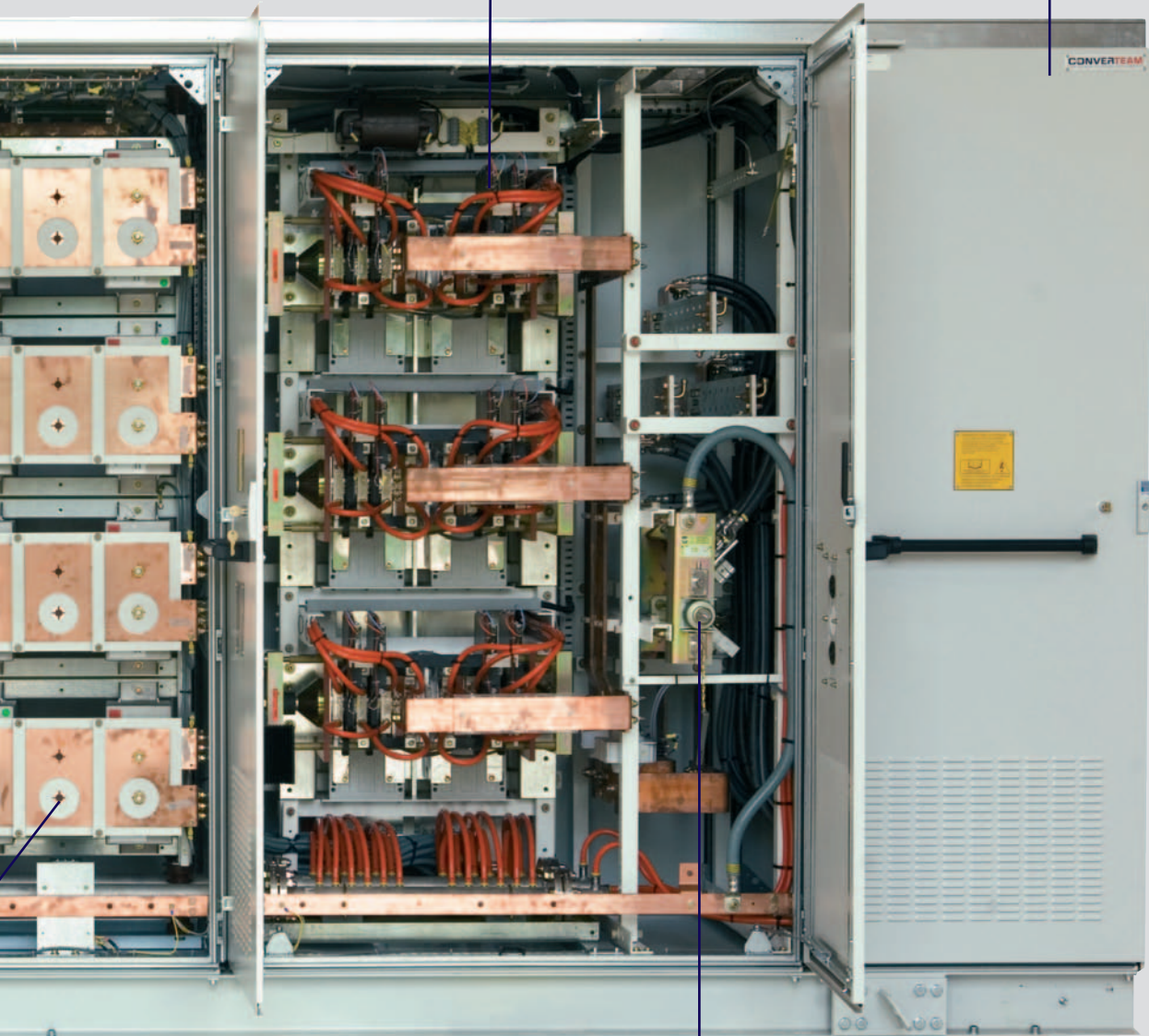


DC link capacitors



**Inverter Unit
Phase Power Stack (PPS)**

«Optional» dv/dt filter



Grounding Switch

MV7000 | DATA SHEET

OUTPUT CHARACTERISTICS

Output voltage	0 - 3.3kV, 0 – 6.6kV
Output power factor	-1 to 1
Output frequency	0 to 90Hz (Higher output frequencies on request)
Motor Inverter type	Pulse width modulated (PWM) 3-level neutral point clamped (NPC)
Motor Type	Induction or synchronous (option)

INPUT CHARACTERISTICS

Input voltage	Medium voltage input transformer for 12 or 24 pulses		
Supply frequency	50/60Hz ± 5%		
Supply converter	12 pulse DFE	24 pulse DFE	AFE
Input power factor	> 0.96		1

GENERAL CHARACTERISTICS

Cooling	Raw water to deionized water heat exchanger. Raw water inlet temp. 15°C to 38°C [$>38^{\circ}\text{C}$ or $<0^{\circ}\text{C}$ with derating ⁽¹⁾]		
Auxiliary voltage	3 phase 400V ± 10%, 1 phase 230V ± 10%, 50Hz		
Efficiency ⁽²⁾	Typically > 0.99%		98.7%
Storage temperature	-20°C to 60 °C (without water in cooling circuit)		
Audio noise	< 75 dB(A) 1 m from cubicle line-up		
Operating ambient temperature	5°C to 45°C		
Humidity	5 to 95% without condensation		
Altitude	< 1000m above mean sea level		
Installation	Indoor		
Color	RAL7035		
Enclosure protection class	IP 31 – Interlocking trap key system		
Standards	IEC		

CONTROL CHARACTERISTICS

Motor control Type	Flux vector control without encoder / induction motor & synchronous (option)
Electronic protections	Over-current, current limit, DC link over and under-voltage, Motor stall, Ground fault, Supply loss ride through
Speed accuracy	< 0.5% without encoder and <0.1% with encoder
Control sources	Drive Data Manager™ Keypad. Remote control. Ethernet link

OPTIONS

	<ul style="list-style-type: none"> Common Mode filter (for AFE transformer-less) AFE Input filter Output Sinus filter (long cable or high speed motor) Output dV/dt filter @ 3.3kV (cables length range 50-200m; other on request) Dynamic Braking Chopper Anti condensation heater Standby pump for Cooling Unit Three-way valve on raw water Direct link to external air to water exchanger with three way valve IP54 Top cable entry Input and/or output isolating switch Encoder board Kinetic Support
⁽¹⁾ Water regulation system required (e.g. three way valve) for water input temperature <15°C	<ul style="list-style-type: none"> Marine Options (including IP33 and anti-condensation heater) ANSI Flange (for Cooling Interface) 3 phase auxiliary voltage 460V-690V 50/60Hz
⁽²⁾ Output power factor 0.9, without option at rated output power (not including auxiliary consumption)	<ul style="list-style-type: none"> Ethernet link: one additional port Serial communication (2 serial ports RS232 with Modbus protocol) External Power Cable Connection (below cubicle)

The MV7000 medium voltage drive

Designed to better serve your needs, MV7000 gives valuable space savings. Power density up to 1.1MVA/m³ for the complete drive is achieved.

Low parts count

The MV7000 requires only twelve PPIs per drive up to 8.4MW (@ 3300V), compared to other drives that require 18 to 36 power switches.

Low component count with high quality devices provides the MV7000 with an inherently more reliable design.

Press-Pack IGBT (PPI)

In 2003, Convertteam introduced PPI in medium voltage drives for their higher power ranges. In addition, to improved compactness and robustness, such devices offer:

- Capability to limit any over-currents with safe turn-off under all operating and failure conditions,
- Case rupture free, and arc ignition free due to pressed contacts and no wire bondings,
- N+1 redundancy: operation with redundant level off is allowed thanks to secured continuous conduction of the PPI in failure mode,
- Long life expectancy versus load cycling,
- High capability at low motor frequency operation.



IGBT Power-Pack (patented)

Phase Power Stack (PPS)

The PPS in the main modular block that allow us to build 3-level NPC inverter. Each PPS includes 4 PPI's and 2 NPC diodes. Each PPI is mounted in a withdrawable power stack. The PPS integrated technology allows fusesless and snubberless design.

Megamodule

The Megamodule is the single block that ensures all the functions of the inverter. This Megamodule integrated technology allows modular arrangements of the MV7000 range as:

- Parallel connection for high power ratings,
- Connection to common DC link of multiple motors and active front end,
- Single phase inverters for dedicated applications.

Based on the success of the PPI and PPS, Convertteam developed Megamodule with higher voltage ratings. 6.6kV is achieved simply by connecting 2 PPIs in series (patented).

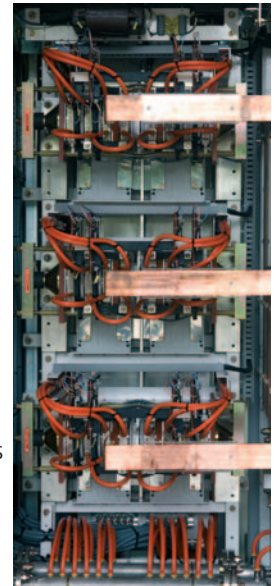
Higher voltages can be reached by connecting more PPI's in series (on request).

Cooling unit

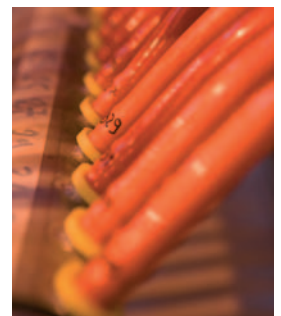
Convertteam has been continuously improving water cooling technology since deionized water cooling was introduced in 1990:

- All pipes & valves in contact with deionized water are in stainless steel,
- Deionized water to fresh water heat exchanger is a high pressure stainless steel plate design,
- Close monitoring of the water conductivity, pressure, flow and leakage),
- Deionized water is distributed to PPS with high pressure, non conductive hoses.

High pressure non conductive hoses



Megamodule





High grade control

The drive controller is a state of the art power electronic controller (PEC) featuring an encoderless vector control (EVC). For dedicated drives, like process drives, a vector control with encoder is also available.

Outstanding benefits

- High level performance dynamic control,
- High reliability,
- Dedicated software for parameters setting, editing, archiving (using a remote PC),
- Fieldbus for connection to automation systems,
- Functional block diagram (FBD) for motor control and application software,
- Drive protection setting and monitoring,
- Full control of drive train transformer and motor auxiliaries.

Adaptability

The PEC is a VME bus controller using the most advanced processor technologies and adaptable, enabling it to cover a wide range of drive applications and configuration options.

Ease to operate

Local set-up and monitoring can be achieved with the drive data manager (DDM). This redefines the key pad concept with menu navigation, on-line help and diagnoses, upload/ download of parameter set, quick start and instrumentation facilities all wrapped up in an ergonomic design with a large display. The DDM is mounted on the control cubicle door.



Maintenance

Reliable components

MV7000 technology, such as robust PPIs and fuseless design, provides a low parts count, which is the key of reliability enhancement, MTBF increase and availability improvement.

Easy access

MV7000 design allows easy front access to the drive components. The power board can be withdrawn easily without need of disconnecting the hydraulic circuit.

Factory test facilities

Personnel safety

MV7000 converters are test proven against arc ignition effect up to short-circuit level 20kA ac. Kirk interlock system and grounding switch are provided as standard.

Services and support

Testing

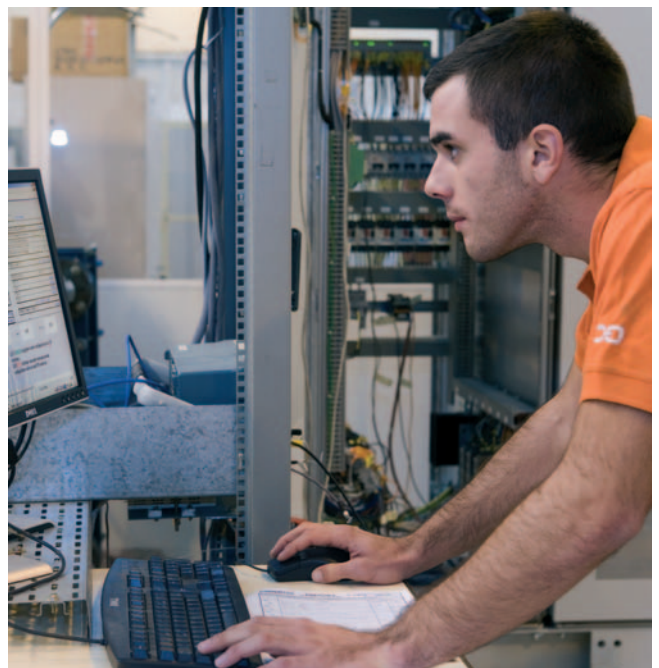
A comprehensive factory testing schedule is carried out on all MV7000s to give further enhanced drive reliability. Full load current and voltage testing is included.

Training

Complete training can be provided on Converteam's medium voltage drives at our factory or your site. A full range of training is available including customized and advanced training.

Commissioning

The MV7000 allows efficient commissioning with reduced start-up time.



www.convertteam.com

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