

# Liquid cooled drives for rough fields of application

The MX pro 4L & 6L frequency inverters are used when drives with particular robustness are required. The integrated liquid cooling permits optimal dissipation of the lost heat from the power part and therefore optimizes the encapsulation of the whole electrical drive unit.



## Special features

The lost heat from the power electronics of the MX pro 4L & 6L frequency inverters are dissipated via a coolant. By means of the innovative cooling system the proven water-glycol-mixture can be used as coolant as well as clean water or industrial water.

The connection for the cooling circuit is well arranged at the top of the inverter close to the back wall, near the separated air flow.

### Highest robustness during operation

- Excellent protection against corrosion due to cooling pipes made of stainless steel
- Marginal deposits due to smooth flow channel
- Reliable operation also when industrial water or fresh water is used for cooling
- Use in an open or closed cooling circuit possible
- Wide temperature range of the coolant up to +55°C

### Reliable and simple installation

- Clear separation of electrical and hydraulic connections
- Internal separation wall between electronics and cooling water
- Complete de-aerating due to the connections arranged at the top

### Consistency to the MX products

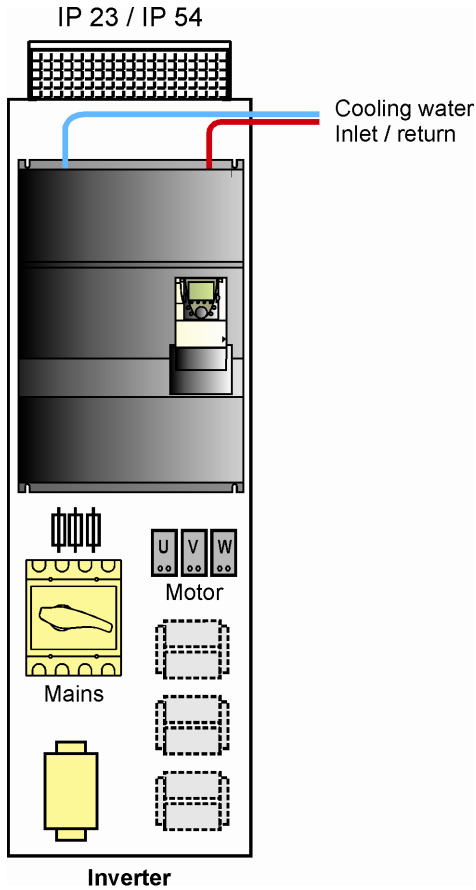
- Control, operation and programming is absolutely identical to the air-cooled devices
- Options of the MX product lines can be used



### Typical applications

Industry  
Plastics machines  
Mining, tunneling  
Shredders  
Ships

## Use of the MX pro 4L & 6L inverters in plastics machines



Liquid cooling of electrical and mechanical units is already best-proven in the area of plastics machines. Due to their robust cooling system, the MX pro 4L & 6L frequency inverters can be particularly integrated into existing cooling concepts.

The distinctive advantage of the MX pro 4L & 6L frequency inverters is their flexibility for different cooling concepts:

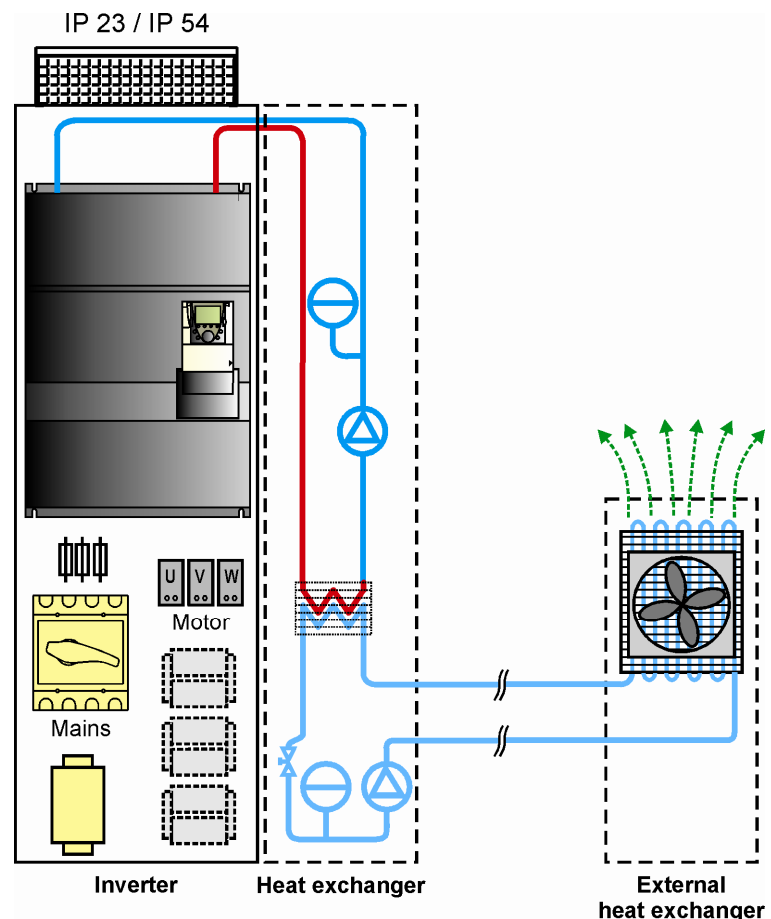
- Open or closed cooling circuit with industrial water
- Open or closed cooling circuit with a high inlet temperature of up to +55°C
- Open cooling system with flowing water cooling

## Use of the MX pro 4L & 6L inverters in industry

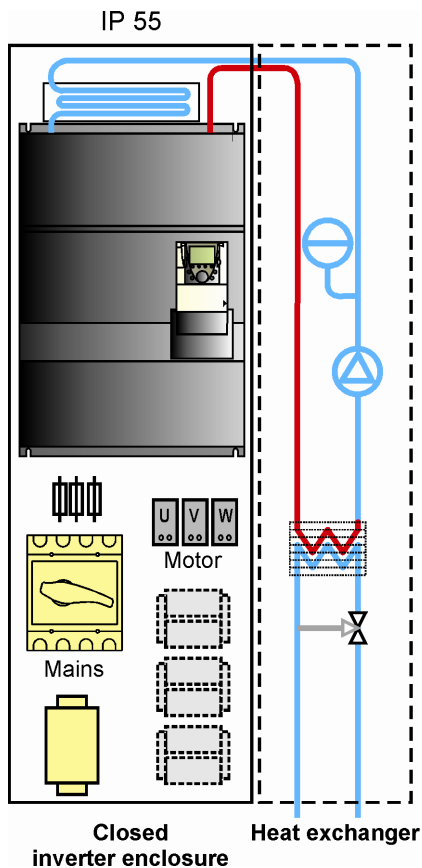
The lost heat of several inverters with high power in an electrical room can easily lead to overheating of the operating room. On the other hand, when the main losses of the inverters are dissipated to a liquid coolant, the installation of an expensive air conditioning can be avoided. With their internal liquid cooling the MX pro 4L & 6L frequency inverter are optimally prepared for these applications. In this concept about 85 % of the inverter losses are dissipated from the electrical room by means of the cooling water.

The distinctive feature of the MX pro 4L & 6L frequency inverters is their flexibility for different cooling concepts:

- With a common cooling circuit it is possible to conduct the losses from the electrical room or container to the heat exchanger.
- In case of a 2-step cooling circuit the air/water heat exchanger can be installed far away from the inverter and with high difference in altitude.



## Use of the MX pro 4L & 6L inverters in mining and tunneling



Enclosures in protection degree IP55 or higher, closed containers or also pressure-resistant encapsulation require a complete heat abstraction of the whole electrical drive unit. Therefore 100 % of the losses must be dissipated by the cooling water. This can be done easily with an additional air/water heat exchanger. Thereby the monitored fans in the inverter provide the required air circulation inside the enclosure.

The significant advantages of the MX pro 4L & 6L frequency inverters for this application are:

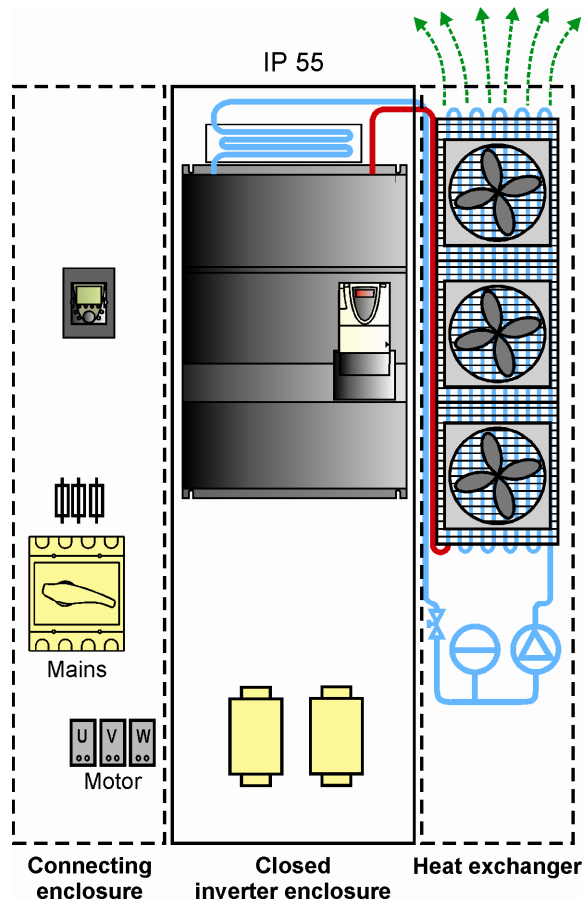
- Fans for internal air circulation are already built-in.
- Full overload is available even in the smallest speed range.
- "Low noise" requirements are optimally fulfilled due to the completely closed inverter unit.

## Use of the MX pro 4L & 6L inverters in shredders

A dust loading even with conductive particles cannot be prevented around shredder drives, especially in case of recycling processes. As a result, special requirements regarding the protection degree are needed for the electrical installation. In a perfectly adapted drive system, sealing walls between the accessible connecting area, the inverter enclosure and the cooling enclosure prevent intrusion of dangerous particles.

The advantages of the MX pro 4L & 6L frequency inverters for this application are:

- The inverter enclosure is securely closed and must not be opened for connection or start-up.
- The very high starting torque is available unchanged also in case of frequent starting.
- The monitored fans in the inverter as well as the air/water heat exchanger reliably provide the required cooling inside the inverter enclosure



## Robust design - simple installation

The today's requirements of our customers as well as our knowledge from more than 20 years experience in manufacturing of liquid cooled power electronics were the specifications for developing the especially robust MX inverters.

### Heat sink:

- Cooling circuit completely made of stainless steel
- Continuously big flow channel
- Smooth internal walls
- Additional fans for reliable internal air circulation



### Cooling circuit:

- Hydraulic and electrical connections are clearly separated
- High permitted temperature range of the cooling water
- Riskless de-aerating
- High-quality, double-sealed connections

General technical data			
Voltage / frequency	MX pro 4L:	380...440 V – 15 + 10% 380...480 V – 15 + 10%	50 Hz ±5 % 60 Hz ±5 %
	MX pro 6L:	500V – 15%... 690V +10%	50/60 Hz ±5 %
Power range	90...800 kW		
Overload	P1: 150 % for 60 s per 10 Minuten, 165 % for 2 seconds P2: 120 % for 60 s per 10 Minuten, 135 % for 2 seconds		
Operating temperature water	+5...+55 °C		
Ambient temperature air	MX pro 4L & 6L: -10...+50 °C / -10...+45 °C		
Filling quantity / flow rate:	MX pro 4L90/110...132/160 MX pro 6L110/132...160/200		0,2 l / 8 l/min
	MX pro 4L160/200...250/315 MX pro 6L200/250...315/400		0,4 l / 24 l/min
	MX pro 4L315/400...500/630 MX pro 6L400/500...630/800		0,7 l / 24 l/min
Standards	Devices are designed, built and tested on the basis of EN 618 00-5-1		
Approvals	CE (UL and CSA in preparation)		

MX pro 4L	Power		Current		Dimensions B x H x T [mm]	Order code [mm]
	400 V [kW]	400 V [A]	400 V [A]	400 V [A]		
MX pro 4L90/110	90/110	179/215			330 x 950 x 377	ELNMP4D90LDB
MX pro 4L110/132	110/132	215/259			330 x 950 x 377	ELNMP4C11LDB
MX pro 4L132/160	132/160	259/314			330 x 950 x 377	ELNMP4C13LDB
MX pro 4L160/200	160/200	314/387			585 x 950 x 377	ELNMP4C16LDA
MX pro 4L200/250	200/250	387/481			585 x 950 x 377	ELNMP4C20LDA
MX pro 4L250/315	250/315	481/616			585 x 950 x 377	ELNMP4C25LDA
MX pro 4L315/400	315/400	616/759			1110 x 1150 x 377	ELNMP4C31LDA
MX pro 4L400/500	400/500	759/941			1110 x 1150 x 377	ELNMP4C40LDA
MX pro 4L500/630	500/630	941/1188			1110 x 1150 x 377	ELNMP4C50LDA

MX pro 6L	Power		Current		Dimensions B x H x T [mm]	Order code [mm]
	690 V [kW]	500 V [kW]	690 V [A]	500 V [A]		
MX pro 6L110/132	110/132	90/110	125/150	136/165	330 x 950 x 377	ELNMP6C11LDB
MX pro 6L132/160	132/160	110/132	150/180	165/200	330 x 950 x 377	ELNMP6C13LDB
MX pro 6L160/200	160/200	132/160	180/220	200/240	330 x 950 x 377	ELNMP6C16LDB
MX pro 6L200/250	200/250	160/200	220/290	240/312	585 x 950 x 377	ELNMP6C20LDA
MX pro 6L250/315	250/315	200/250	290/355	312/390	585 x 950 x 377	ELNMP6C25LDA
MX pro 6L315/400	315/400	250/315	355/420	390/462	585 x 950 x 377	ELNMP6C31LDA
MX pro 6L400/500	400/500	315/400	420/543	462/590	1110 x 1150 x 377	ELNMP6C40LDA
MX pro 6L500/630	500/630	400/500	543/675	590/740	1110 x 1150 x 377	ELNMP6C50LDA
MX pro 6L630/800	630/800	500/630	675/840	740/900	1110 x 1150 x 377	ELNMP6C63LDA