

# ADV200-LC LIQUID COOLED INVERTER

Confiability,  
robustness and  
**energy efficiency**



Industrial Motors

Commercial &  
Appliance Motors

**Automation**

Digital &  
Systems

Energy

Transmission &  
Distribution

Coatings

Driving efficiency and sustainability





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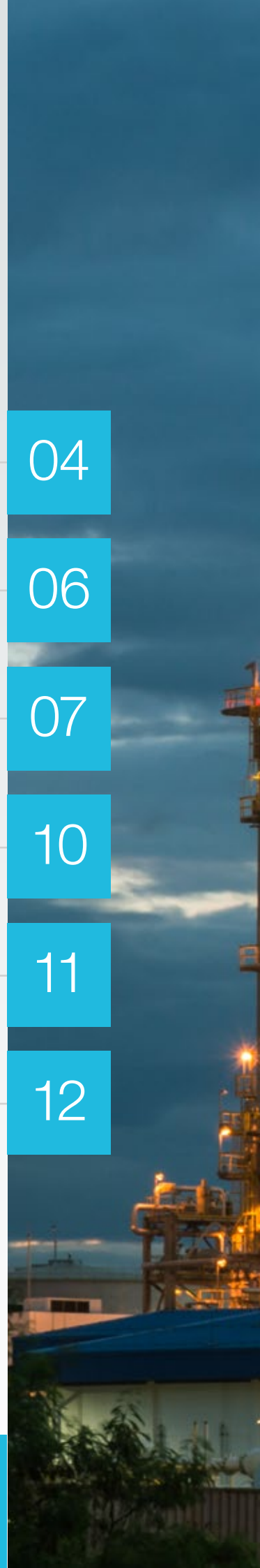
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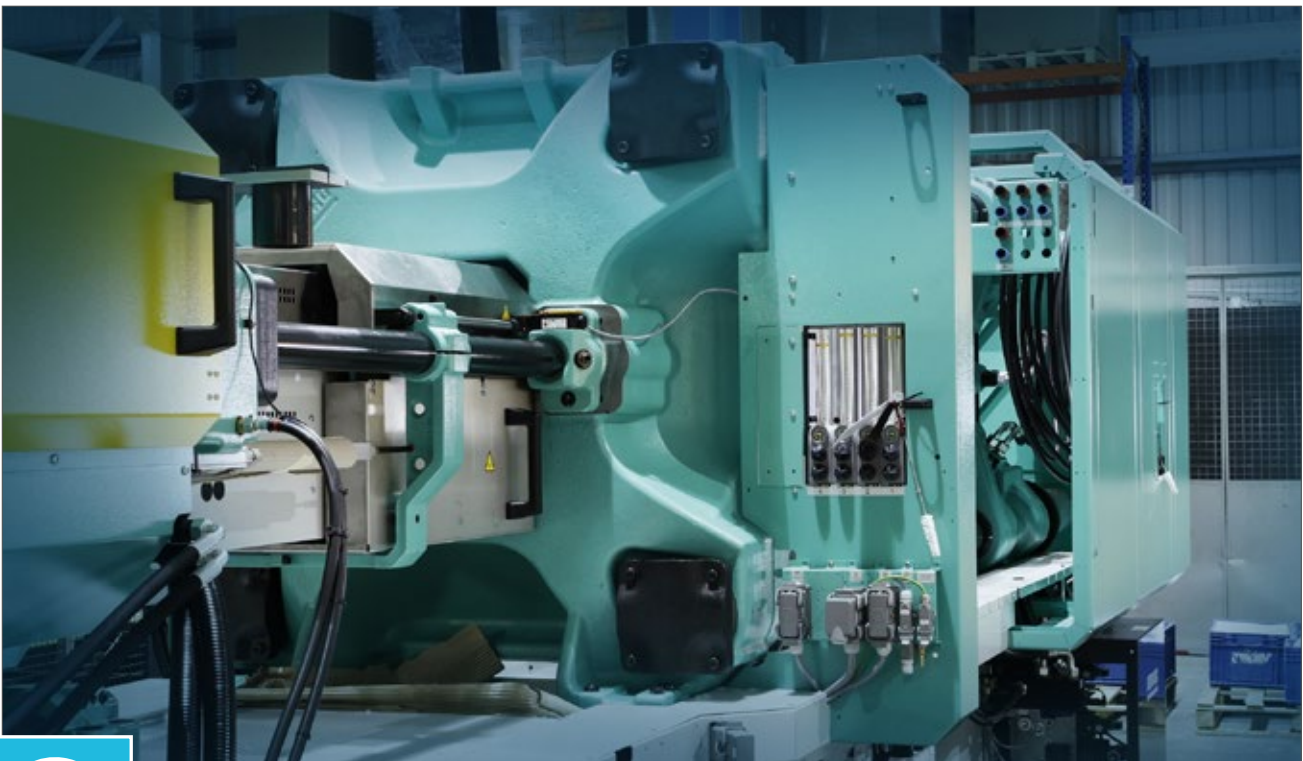




# Applications



Mining



Plastic



Tunnel drilling



Pumping stations

## Description



The ADV200-LC series is used in applications that demand robustness, long life, and maximum reliability. Liquid cooling systems of electrical and mechanical units, widely used in plastic processing equipment, significantly reduces the size of the electrical drive. Thanks to a very robust dissipation system, the ADV200-LC series supports the already available air-cooled line and integrates with great flexibility in existing systems.

### Power range

Models	Power (kW)															
	30	37	45	55	75	90	110	132	160	200	250	315	355	400	800	900
ADV200-LC-4	Size 4			Size 5			Size 6		Size 7		Size 8			Parallel size 8 <sup>1)</sup>		

Note: 1) Inverters of over 800 kW comprise one master MASTER unit and one or more SLAVE units. Higher power ratings on request.

### Drive type designation

ADV200-LC	-X	XXX	-X	X	X	-X	-XX	XX	-SI	-E54
										Version with mounting rear panel heat sink with IP54 protection rating
										Integrated "Safety STO" function
										Total power parallel drive, in kW: 08 = 800.0 kW 09 = 900.0 kW 12 = 1,200.0 kW
										Only for parallel versions: MS = Master SL = Slave
										Rated voltage: 4 = 400 V ac
										Software: X = standard
										Braking unit: X = not included R = included + integrated braking resistor B = included
										Keypad: X = not included K = included
										Drive power, in kW
										Mechanical drive sizes
										Drive ADV200-LC series



### Weights and dimensions

Sizes	Dimensions: Width x Height x Depth		Weight	Weight (-E54)
	mm	inches	kg (lbs)	kg (lbs)
4300...4450 (-E54)	200 x 570 x 286 (286 x 586 x 280)	7.87 x 22.44 x 11.26 (11.26 x 23.07 x 11.02)	30 (66)	32 (70.5)
5550...5900 (-E54)	310 x 570 x 286 (396 x 593 x 280)	12.20 x 22.44 x 11.26 (15.6 x 23.35 x 11.02)	42 (92)	45 (99.2)
61100...61320 (-E54)	310 x 920 x 270 (396 x 935.8 x 262.9)	12.20 x 36.22 x 10.63 (15.6 x 36.84 x 10.35)	60 (132)	64 (141.1)
71600...72000 (-E54)	350 x 920 x 320 (436 x 936 x 312.9)	13.78 x 36.22 x 12.60 (17.16 x 36.85 x 12.32)	90 (198)	94.7 (208.8)
82500...84000 (-E54)	358 x 1,070 x 396.5 (436 x 1,086 x 389.5)	14.09 x 42.12 x 15.61 (17.16 x 42.75 x 15.33)	90 (198)	96 (211.6)
(900 kW -E54) (1200 kW -E54)	(1,028 x 1,086 x 389.5)	(52.28 x 42.75 x 15.33)	-	288 (634.8)

## General characteristics

Power supply	380 V ac -15%...480 V ac +10%, 50/60 Hz ±5%
Connection to TT and TN networks	Yes, standard version
Connection to IT networks	Yes, only with dedicated ADV200-LC...-IT version (on request).
Power ratings	30...1,200 kW, higher on request
Maximum output voltage	0.98 x Vin
Maximum output frequency f2	500 Hz (sizes 4300...72000) 200 Hz (sizes 82500...84000)
Total harmonic distortion (THD)	40% light duty, 50% heavy duty (at rated current)
IGBT braking unit	Models KBX: internal braking unit with external resistor Models KXX: not included
Overload (for synchronous motor)	Heavy duty: 160% x In (1' each 5'), 200% x In (for 3") Light duty: 110% x In (1' each 5')
Overload (for asynchronous motor)	Heavy duty: 150 % x In (1' each 5'), 180% x In (for 0.5") Light duty: 110 % x In (1' each 5')
Control mode	Open-loop vector control Vector control with feedback Open loop V/f and V/f with feedback
Integrated "Safety STO" function	Compliant with SIL3 machine safety directive
Optional cards	Integration of up to 3 options onboard the drive
Multi-language programming SW	WEG_eXpress (5 languages)
PLC	PLC with advanced IEC 61131-3 programming environment
Cooling liquid temperature	0...35 °C. Up to 45 °C with current derating
Flow rate	6...30 l/min, depending on the module size
Fieldbus management	RS485, Modbus-RTU. Optional: Modbus-RTU to Modbus-TCP gateway, DeviceNet, Profibus-DP, CANopen, EherCAT, Industrial Ethernet, PROFINET

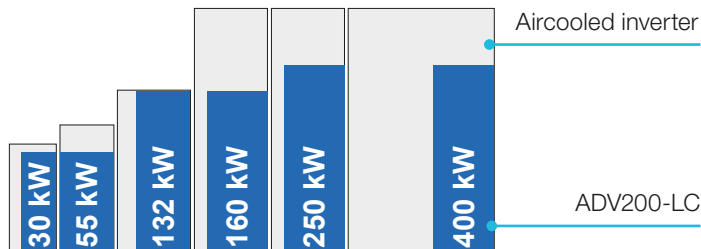
Precision	Asynch.	Control mode	Speed control precision	Control range	
		FOC with feedback	±0.01% motor speed rating	1:1000	
		Open-loop FOC	±30% motor slip rating	1:100	
		V/f	±60% motor slip rating	1:30	
		Synch.	FOC with feedback	±0.01% motor speed rating	1:1500
			Open-loop FOC	±0.1% motor speed rating	1:20

Standard supply configuration	Programming keypad	Integrated
	Regulation	<ul style="list-style-type: none"> <li>- 2 analog inputs (voltage or current)</li> <li>- 2 analog outputs (1 voltage/current, 1 voltage)</li> <li>- 6 digital inputs (PNP/NPN)</li> <li>- 2 digital outputs (PNP/NPN)</li> <li>- 2 relay outputs, single contact</li> <li>- RS485 serial line (Modbus-RTU)</li> </ul>
	Power	<ul style="list-style-type: none"> <li>- Integrated DC choke up to 200 kW. External choke mandatory for higher powers</li> <li>- Integrated braking module up to 90 kW (models -KBX)</li> </ul>
	Reference resolution	<ul style="list-style-type: none"> <li>- Digital = 15bit + sign</li> <li>- Analog input = 11-bit + sign</li> <li>- Analog output = 11-bit + sign</li> </ul>
Confor- mity	EMC compatibility	Integrated EMC filter (EN 61800-3, 2nd environment, category C3)
	Safety standards	Electrical safety: LVD: IEC/EN 61800-5-1; UL: 508C Functional safety: EN 61800-5-2; SIL 3; ISO EN 13849-1, PL "e"
Environmental conditions	Climatic conditions	EN 60721-3-3
	Ambient temperature	-10 °C...+50 °C (+14 °F...+122 °F)
	Altitude	Max 4,000 m (a.s.l.), up to 1,000 m without derating
Markings		Complies with the EC directive concerning low voltage equipment (Directive LVD 2014/35/EU, EMC 2014/30/EU, RoHS 2011/65/EU)
		UL, cULus. Complies with directives for the American and Canadian markets

## General characteristics

### Compact

Considerably smaller than an aircooled inverter.



### Integrated filter and choke

EMC filter standard for entire series, integrated choke up to 200 kW.



### Backup supply

ADV200 can be supplied through an external +24 V dc supply in order to be kept active in case of mains input loss, ensuring in this situation the operation of all monitoring functions, programming and any connected fieldbus network.

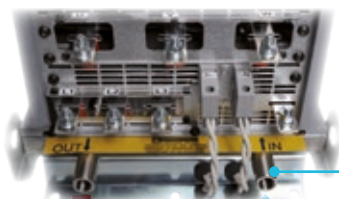
### Smart connections

Dedicated accessories and fully removable terminals, ensure simple and fast installation and startup in compliance with the EMC normative.

### Fast access

Structured to offer simple and fast management of the product in any situation of installation and mounting.

From the terminal access to the rack assembling of the options, each operation is quick and easy.

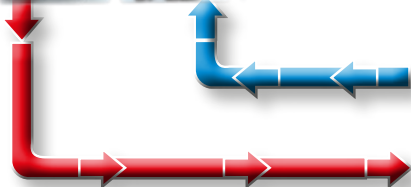


### Liquid cooling

Heatsink with an innovative cooling system.

Liquid cooling provides perfect heat dissipation and optimizes the drive in the electrical panel.

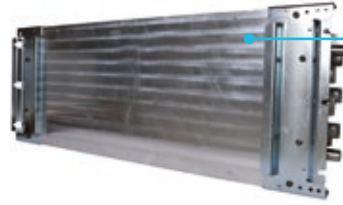
Wide cooling liquid temperature range (up to +45 °C).





### Programming keypad

- 4 lines display for 21 characters
- Clear alphanumeric text
- Full information of any parameters
- Fast navigating keys
- Key for displaying the last 10 parameters that have been changed
- DISP key for rapid display of operating parameters
- Upload - Download and storage of 5 complete sets of drive parameters
- Remotable up to 10 meters



### Corrosion protection

Excellent corrosion protection with aluminium cooling pipes, stainless steel connectors and internal separation of electronics and cooling liquid.

### Programmable anti-condensation function

Real-time measurement of absolute air humidity (through an integrated sensor). Detection of the drive internal air temperature with indication of the coolant temperature.

### Reduced noise & energy saving

No internal fan ventilation on power part.  
Less noise during system functioning.

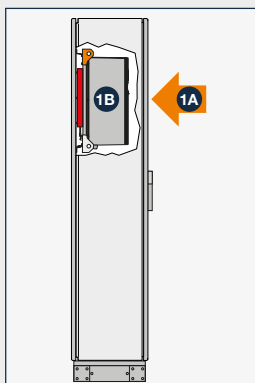
Sizes	External braking resistor					
	Type	Code	Total Rbr [ohm]	Resistor power [W]	Enclosure	Q.ty
ADV200-LC-4300-KBX ADV200-LC-4370-KBX	BRT4K0-11R6	S8T00H	11.6	4,000	IP20	1
ADV200-LC-4450-KBX ADV200-LC-5550-KBX	BR T8K0-7R7	S8T00I	7.7	8,000	IP20	1
ADV200-LC-5750-KBX	BRT8K0-9R2	S8T00Q	4.6	16,000	IP20	2
ADV200-LC-5900-KBX	BR T8K0-7R7	S8T00I	3.85	16,000	IP20	2

### Assembly

ADV200-LC offers a simple and versatile mechanical solution for installing the drive inside or outside the panel and for positioning the internal or IP54 external heatsink.

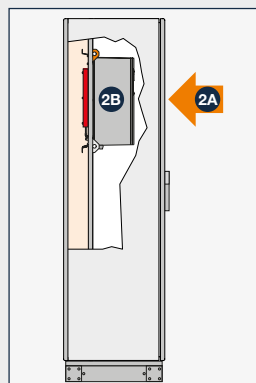
#### 1) Internal heatsink and insertion from inside:

ADV200-LC inverter (1B) is inserted in cabinet (1A) using standard eyebolts; heatsink is inside panel (1B).



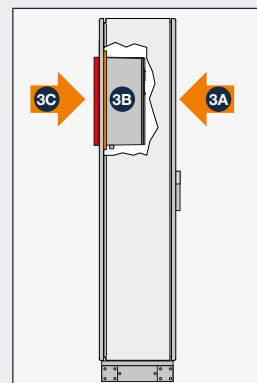
#### 2) External heatsink and insertion from inside:

ADV200-LC is inserted in cabinet (2A) using standard eyebolts; heatsink is separated from the internal section of the panel (2B). Use additional brackets A and B for fastening (kit brackets accessory).



#### 3) External heatsink and insertion from inside/ outside (IP54):

ADV200-LC-...-E54 inverter (3B) is inserted in cabinet (3A/3C); heatsink is outside panel.



Brackets A and B



## Cooling system

There are two types of circulation systems:

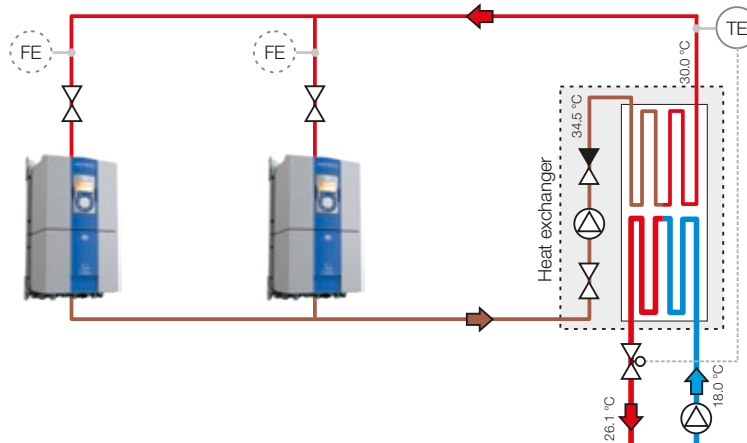
### Open system

- Has no pressure and allows free contact with air.

### Closed system (recommended)

- An Heat Exchanger is used. The circuit is completely air-tight and there is pressure in the pipes. The pipes must be in metal or in specific plastic or rubber with an oxygen barrier.

WEG advises you to equip the cooling system with flow (FE) and pressure control and a monitor PH.



Closed circuit cooling system (example)

### Specifications of coolant and its circulation

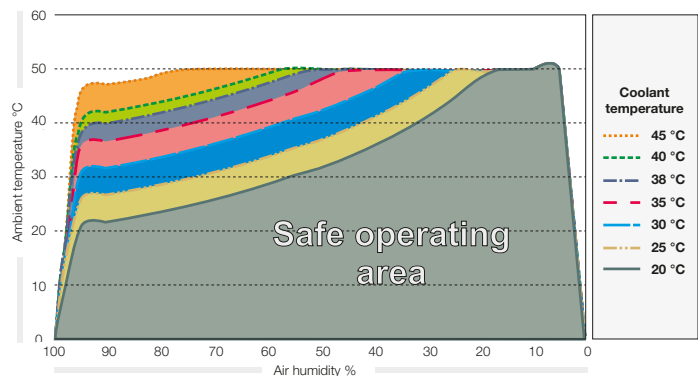
Sizes	Water temperature at input [°C]	Cooling agents	Cooling liquid temperature	Nominal liquid flow <sup>1)</sup> [l/min]	Max. liquid flow [l/min]	Liquid volume [cm <sup>3</sup> ]	Pressure drop plate <sup>2)</sup> [mBar]	Maximum pressure [Bar]	Connection system
4300	0° C...+35 °C (+32 °F...95 °F), 35 °C...45 °C (+95 °F...113 °F) with derating (1.5% each degree higher); condensation not allowed	Drinking water or water-glycol mixture or demineralized water	0...35 °C (45 °C with derating / -8 °C ... 0 °C with 20% glycol)	6	15	190	290	6	3/8 G female
4370				7	15	190	290	6	3/8 G female
4450				8	15	190	290	6	3/8 G female
5550				8	15	332	510	6	3/8 G female
5750				9	15	332	510	6	3/8 G female
5900				10	15	332	510	6	3/8 G female
61100				11	20	405	755	6	3/8 G female
61320				12	20	405	755	6	3/8 G female
71600				24	27	600	1,750	6	3/8 G female
72000				25	27	600	1,750	6	3/8 G female
82500				30	35	1,085	1,630	6	1/2 G female
83150				30	35	1,085	1,630	6	1/2 G female
83550				30	35	1,085	1,630	6	1/2 G female
84000				30	35	1,085	1,630	6	1/2 G female

Notes: 1) Water/Glycol mixture 80:20.

2) At nominal flow, connectors excluded.

### Condensation, safe operating area

use the graph on side to calculate whether operating conditions (combination of ambient temperature, humidity and cooling liquid temperature) are safe, or to choose the allowed cooling liquid temperature. Safe conditions are obtained when the work point is under the respective curve. Otherwise, you have to take adequate precautions to lower the ambient temperature and/or the relative humidity or to raise the cooling liquid temperature.



## Options and accessories

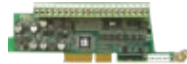


- SLOT 1: I/O expansions
- SLOT 2: encoder interface and I/O exp. cards
- SLOT 3: Fieldbus and I/O expansions cards
- Integrated "Safety STO" function (-SI models)

### Option cards

All of the options available for the ADV200 series can be used. 3 optional cards can be managed simultaneously:

#### Encoder interface



Option	Code	Description
EXP-DE-I1R1F2-ADV	S5L30	TTL/HTL digital incremental encoder expansion card 1 encoder input - 1 encoder output - 2 freeze channels
EXP-DE-I2R1F2-ADV	S5L35	TTL/HTL digital incremental encoder expansion card 2 encoder inputs - 1 encoder output - 2 freeze channels
EXP-SE-I1R1F2-ADV	S5L31	Sinusoidal incremental encoder expansion card 1 encoder input - 1 encoder output - 2 freeze channels
EXP-SESC-I1R1F2-ADV	S5L32	Sincos incremental encoder expansion card 1 encoder input - 1 encoder output - 2 freeze channels
EXP-EN/SSI-I1R1F2-ADV	S5L33	Absolute EnDat/SSI encoder expansion card 1 encoder input - 1 encoder output - 2 freeze channels
EXP-HIP-I1R1F2-ADV	S5L34	Absolute Hiperface encoder expansion card 1 encoder input - 1 encoder output - 2 freeze channels
EXP-ASC-I1-ADV	S5L42	Absolute SinCos expansion card 1 encoder input
EXP-RES-I1R1-ADV	S5L43	Resolver expansion card 1 Resolver input - 1 Resolver repetition output

#### Fieldbus interface



EXP-CAN-ADV	S527L	Expansion card for CANopen® and DeviceNet interface
EXP-PDP-ADV	S530L	Expansion card for Profibus-DP interface
EXP-ETH-GD-ADV200	S5L29	Ethernet GD-net interface expansion card
EXP-ETH-CAT-ADV200	S5L09	EtherCAT interface expansion card
EXP-ETH-IP-ADV200	S5L19	Industrial Ethernet® interface expansion card
EXP-ETH-PN-ADV	S5L60	Profinet interface expansion card

#### I/O expansions



EXP-IO-D5R8-ADV	S5L38	4 digital inputs / 1 digital output / 8 relay output
EXP-IO-D6A4R1-ADV	S526L	4 digital inputs / 2 digital outputs / 2 analog inputs / 2 analog outputs / 2 double contact relays
EXP-FL-XCAN-ADV	S5L41	Master CAN controller and Fast Link interface
EXP-IO-SENS-100-ADV	S5L40	To acquire signals from Pt-100 (Pt-1000), (Ni1000), 0-10 V, 0/4...20 mA, KTY84, PTC
EXP-IO-SENS-1000-ADV	S5L37	

Note: 1) Compatible to industry standards.

### Integrated "Safety STO" function (-SI models)

The function allows the motor to be disabled without the use of a safety contactor on the drive output. It guarantees compliance with the machine safety directive and meets the following standards:

- SIL3 according to EN 61508 and EN 61800-5-2
- PL e according to EN 13849-1

### Serial line

Integrated standard RS485 serial line with Modbus-RTU protocol, for peer-to-peer or multidrop connections (with OPT-485-ADV card).

### Accessories



Identification	Code	Description
Fast coupling connection kit sizes 4-5-6-7	S728942	The kit consists of Hose barb rapid (no.2) and rapid connection thread "no leakage" (no.2), inox 303.
Fast coupling connection kit size 8	S728943	



Extension tube sizes 4-5-6	S728952	The kit consists of no.2 extension tubes with male and female swivel connections, inox 303, length 1.5 mt
Extension tube size 7	S728954	
Extension tube size 8	S728955	

Identification	Code	Description
Bracket kit size 4	S728961	The kit consist of no.2 fixing brackets and a series of bolts (no. 2 M10 x 20 mm + no. 4 M6 x 20 mm) for mounting the inverter in cabinet as indicated on page 9.
Bracket kit sizes 5 - 6	S728962	
Bracket kit size 7	S728964	
Bracket kit size 8	S728965	



## Choosing the inverter

The combinations of motor power ratings and inverters listed in the table shows the use of motors in which the voltage rating is equal to that of the mains power.

For motors with different voltage ratings the inverter must be chosen according to the current rating of the motor.

The combinations listed in the table thus show the current that can be delivered by the drive during continuous operation and overload conditions, according to the mains voltage.

The same engineering criteria apply for operations with additional derating factors (see drive instruction manual).

### Input data

Sizes	AC input current for continuous operation In <sup>1)</sup>		Input voltage [V dc]	DC Input voltage <sup>1)</sup>	
	Heavy duty (150% overload)	Light duty (110% overload)		DC input current <sup>2)</sup>	
	[Arms]	[Arms]		[Arms]	[Arms]
4300	53	64	450 - 750 V dc	65	80
4370	64	74		80	90
4450	74	89		90	125
5550	100	143		125	175
5750	143	171		175	210
5900	171	200		210	240
61100	200	238		240	290
61320	238	285		290	350
71600	300	350		370	430
72000	350	420		430	510
82500	420	580		510	710
83150	580	640		710	780
83550	640	710		780	850
84000	770	900		940	900
800 kW <sup>3)</sup>	1,510	1,710		1,840	2,090
900 kW <sup>4)</sup>	1,650	1,800		2,020	2,260
1200 kW <sup>5)</sup>	2,250	2,580		2,750	3,160

Notes: 1) Cosphi motor 0,9 @ 400 V ac.

2) RMS input current in case of power from 6 impulse bridge.

3) 800 kW = parallel version (n.1 ADV200 LC-84000-...-4-MS 08 + n.1 ADV200 LC-84000-...-4-SL).

4) 900 kW = parallel version (n.1 ADV200 LC-83150-...-4-MS 09 + n.2 ADV200 LC-83150-...-4-SL).

5) 1200 kW = parallel version (n.1 ADV200 LC-84000-...-4-MS-... + n.3 ADV200 LC-84000-...-4-SL).

### Output data

Sizes	Inverter Output		Pn mot (recommended asynchronous motor rating, fsw = default)			
	Heavy duty	Light duty	Heavy duty		Light duty	
	[kVA]	[kVA]	@400 V ac [kW]	@460 V ac [Hp]	@400 V ac [kW]	@460 V ac [HP]
4300	43	52	30	40	37	50
4370	52	60	37	50	45	60
4450	60	73	45	60	55	75
5550	73	104	55	75	75	100
5750	104	125	75	100	90	125
5900	125	145	90	125	110	150
61100	145	173	110	150	132	175
61320	173	208	132	175	160	200
71600	208	267	160	200	200	250
72000	267	319	200	250	250	300
82500	319	409	250	300	315	400
83150	409	450	315	400	355	450
83550	450	506	355	450	400	500
84000	506	603	400	500	500	650
800 kW	956	1,109	800	1,000	900	1,200
900 kW	1,109	1,247	900	1,200	1,000	1,300
1200 kW	1,420	1,670	1,200	1,600	1,400	1,800

## Choosing the inverter

### Output data

Sizes	Rated output current In (for asynchronous motors)				Rated output current In (for synchronous motors)			
	@400 V ac		@460 V ac		@400 V ac		@460 V ac	
	Heavy duty	Light duty	Heavy duty	Light duty	Heavy duty	Light duty	Heavy duty	Light duty
	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]
4300	62	75	55.8	67.5	56	68	50.4	61.2
4370	75	87	67.5	78.3	68	78	61.2	70.2
4450	87	105	78	94.5	78	95	70.2	85.5
5550	105	150	94.5	135	95	135	85.5	121.5
5750	150	180	135	162	135	162	122	146
5900	180	210	162	189	162	189	146	170
61100	210	250	189	225	189	225	170	203
61320	250	300	225	270	225	270	203	243
71600	300	385	270	347	270	347	243	312
72000	385	460	347	414	347	414	312	373
82500	460	590	414	531	414	531	373	469
83150	590	650	531	585	531	585	469	527
83550	650	730	585	657	585	657	527	591
84000	730	870	657	783	657	783	591	705
800 kW	1,380	1,600	1,242	1,440	1,242	1,440	1,118	1,296
900 kW	1,600	1,800	1,440	1,620	1,440	1,620	1,296	1,458
1200 kW	2,050	2,410	1,845	2,169	1,845	2,169	1,661	1,952

Sizes	Switching frequency fsw		Reduction factor								
	Default	Higher	Kv <sup>1)</sup>	KtI <sup>2)</sup>	Kalt <sup>3)</sup>	Kf <sup>4)</sup>					
						2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
4300	4	6, 8, 10, 12	0.9	1.5	1.2	1	1	0.85	0.7	0.6	0.5
4370	4	6, 8, 10, 12	0.9	1.5	1.2	1	1	0.85	0.7	0.6	0.5
4450	4	6, 8, 10, 12	0.9	1.5	1.2	1	1	0.85	0.7	0.6	0.5
5550	4	6, 8	0.9	1.5	1.2	1	1	0.85	0.7	0	0
5750	4	6, 8	0.9	1.5	1.2	1	1	0.85	0.7	0	0
5900	4	6, 8	0.9	1.5	1.2	1	1	0.85	0.7	0	0
61100	4	6, 8	0.9	1.5	1.2	1	1	0.85	0.7	0	0
61320	4	6, 8	0.9	1.5	1.2	1	1	0.85	0.7	0	0
71600	4	-	0.9	1.5	1.2	1	1	0	0	0	0
72000	4	-	0.9	1.5	1.2	1	1	0	0	0	0
82500	4	-	0.9	1.5	1.2	1	1	0	0	0	0
83150	4	-	0.9	1.5	1.2	1	1	0	0	0	0
83550	4	-	0.9	1.5	1.2	1	1	0	0	0	0
84000	4	-	0.9	1.5	1.2	1	1	0	0	0	0
800 kW	4	-	0.9	1.5	1.2	1	1	0	0	0	0
900 kW	4	-	0.9	1.5	1.2	1	1	0	0	0	0
1200 kW	4	-	0.9	1.5	0.5	1	1	0	0	0	0

Notes: 1) Kv: derating factor for mains voltage at 460 V ac or AFE200 power supply.

2) KtI: derating factor for water temperature >35 °C. Value to be applied = 1.5% at each centigrade degree increase above 35 °C (up to a maximum of 45 °C).  
For example: water temperature = 40 °C, KtI = 1.5% \* (40 - 35) = 7.5% of derating; In derated = 100 - ((7.5\*100)/100) = 92.5% In.

3) Kalt: derating factor for installation at altitudes above 1,000 meters a.s.l. Value to be applied = 1.2% each 100 m increase above 1,000 m (up to a maximum of 3,000 m).

For example: altitude 2,000 m, Kalt = 1.2% \* 10 = 12% derating; In derated = 100 - ((12\*100)/100) = 88 % In.

4) Kf: derating factor for higher switching frequency.

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 +39 02 967601

 [info.motion@weg.net](mailto:info.motion@weg.net)

 Gerenzano (VA) Italy

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The values shown are subject to change without prior notice.  
The information contained is reference values.