Mains operated power supply voltage	230 Vac +10% - 15% single-phase
Galvanic isolated auxiliary supply voltage	24 Vdc +/- 15% - 300 mA
Motor phase-to-phase output voltage	200 Varms
Integrated braking resistor	100 R / 35 W
External braking resistor (disconnection of the internal resistor)	Minimum external resistor: 50 / 200 W (dp 50/200)
Minimum phase-to-phase inductance	1 mH

Output current ratings

TYPE	Max. output current for 1 s (Arms) +/-5 % (230 Vac)	Rated output current (Arms) (230 Vac)	Joule losses (W)	Rated input current (Arms) (230 Vac, 60 Hz)	Certified max. protection line circuit fuses A60Q	Main short-circuit power	UL C.TUV.US compliance
LBD – 2305	5.65	2.5	30	2,5	20 A	5 kA	In progress
LBD – 2311	11.3	5	55	5	20 A	5 kA	In progress
LBD – 2317	17	8	66	8	20 A	5 kA	In progress

Maximum room temperature	40°C.
Operation power restriction in single-phase	Continuous RMS power ensuring a capacitor lifetime of 20 000 hours: 650 W for ratings 230/5 and 11 1000 W for rating 230/17
Mains filter on power supply	Integrated in the drive
Common mode filter on auxiliary supply	Integrated in the drive
Position sensor	Transmitter resolver Incremental encoder (TTL or SinCos signals) Incremental encoder + Hall Effect sensors Absolute Hiperface encoder
Power protections	See section 3.2.1 - LEDs
Switching frequency	8 kHz
Analog input 1	0 to +10 V (resolution: 12 bits)
Analog input 2	0 to +10 V (resolution: 12 bits)
Speed and position regulators	Sampling period = 0.5 ms Anti-wind-up system of the integrator Anti-resonance filter Adjustable digital gains
Speed loop bandwidth	Selectable cut-off frequency for 45° phase shift: 50 Hz, 75 Hz or 100 Hz
Current loop bandwidth	Cut-off frequency for 45° phase shift: 1000 Hz
Max. motor speed	Adjustable from 100 to 25 000 rpm
Encoder position output for CANopen version. **No encoder output available on EtherCAT® version**	Quadrature signals A & B with Z marker pulse. RS 422 line transmitter Programmable resolution: 64 ppr to 16384 ppr (according to max. motor speed) Accuracy in arc minutes = (8 + 5400/resolution) Note: the total position accuracy must take into account the accuracy of the resolver used.
Resolver input	Excitation frequency: 8 kHz Transformation ratio: 0.3 to 0.5 (other values are factory set)
Encoder input	Software selectable Quadrature signals A & B + one Z marker pulse per rev. Line receiver RS-422 Max. frequency of encoder pulses: 1 MHz Resolution: 500 à 106 ppr
Pulse & Direction input	Software re-configuration of 2 logic inputs for stepper motor emulation: Max. pulse frequency: 10 kHz Resolution: programmable.
7 opto-isolated and parameterizable logic inputs	5 software configurable logic inputs 2 inputs dedicated to the STO (Safe Torque Off) function
"Amp OK" output	"OptoMos" relay: output open if fault Umax = 50 V, Imax = 300 mA
3 parameterizable logic outputs	Type PNP "high side" 24Vdc, max. 200 mA

Analog output	2.5 V +/-2.5 V, resolution: 8 bit, load: 10 mA Low-pass filter: 160 Hz, programmable output signal: all objects can be mapped.
Error display	Front panel LEDs + diagnostic via serial link or CAN bus
Motor and application parametrization	Serial link RS-232 or bus interface with CANopen communication protocol
CAN interface	CANopen Protocol (DS301, DSP402)
EtherCAT® interface	See **EtherCAT® Fieldbus Interface** manual
Automatic functions	Drive adjustment to the motor (AUTO-PHASING) Adjustment of the servos (AUTO-TUNING)
Temperature: - storage: -20° C to +70° C - operation: +5° C to +40° C	Max. temperature: 50°C From 40° C, the rated currents must be reduced of 3 % per Additional Celsius degree
Altitude	1000 m
Moisture	< 50 % at 40° C and < 90 % at 20° C: EN 60204-1 standard **Condensation prohibited (storage and operation)**
Cooling	Natural ventilation or forced air according to the current rating. Check for free ventilation and no obstruction of the upper or lower air admissions
Environment	Open chassis to be mounted in a housing protecting the amplifier from conducting dust and condensation (pollution degree 2 environment)
Mounting position	Vertical
Mounting location	Closed cabinet without any conducting and/or corroding agents, and according to the room temperature requirements. **Condensation prohibited**
Weight	Pac-230/5, 11 and17: 1.5 kg.

LBD Drive CONNECTIONS

MOTORS CONNECTOR: RESOLVER

Signal	SMB/MB motors series			MMB motors series
	Mil Connector	Interconnectron connector	Clip Box	Interconnectron connector
SIN +	F	2	6	1
SIN -	E	1	5	6
COS +	D	11	4	2
COS -	C	12	3	3
EXCT +	A	10	1	7
EXCT -	B	7	2	11
PTC	K	8	7	9
PTC	J	9	8	10
Shield	G/H	4	N.C.	8

MOTORS CONNECTOR: POWER SUPPLY

Signal	SMB/MB motors series			MMB motors series
	Mil Connector	Interconnectron connector	Clip Box	Interconnectron connector
U	A	1	A	1
V	B	2	B	3
W	C	6	C	4
Brake+ 24V	G	4	9**	C
Brake -	F	5	10**	D
Ground	D/E	3	D	⏚

Nota: * braking resistors must be ordered separately.
** connected pin in the resolver clip box.
*** See "**Installation Guide**" for other specifications.

X5 CONNECTOR: SERIAL LINK RS-232 port Sub D 9 pins male connector

LBD CANopen bus drive version		
Pin	**Symbol**	**Description**
5	GND	GND (shield connection if no 360° connection on the connector). 360° shield is strongly recommended.
3	TXD232	Transmit data RS-232
2	RXD232	Receive data RS-232

LBD EtherCAT bus drive version		
Pin	**Symbol**	**Description**
5	GND	GND (shield connection if no 360° connection on the connector). 360° shield is strongly recommended.
3	TXD	Transmit data RS-232
2	RXD	Receive data RS-232
1	CAN-H	Ligne CAN-H (dominant high)
9	CAN-L	Ligne CAN-L (dominant low)

X8 CONNECTOR: AUXILIARY SUPPLY AND BRAKE 4 pins male connector

Pin	Symbol	I/O	Function	Description
1	Brake GND	O	Motor brake supply reference	Grounded potential reference (GND reference)
2	Brake +	O	Motor brake supply 48 Vdc max / Imax = 1.5 A	Pins 2 and 3 internaly connected on X8 for an easier wiring relay
3	Brake In	I	Signal connection for the motor brake supply wiring relay 48 Vdc max. / 1.5 A max.	See diagram of section 5.3.2. The brake supply may be different from the amplifier 24 Vdc but must have the same GND potential reference.Max. brake supply value: 48 Vdc
4	24 V	I	Mains isolated 24 Vdc auxiliary supply	224 Vdc supply: +/- 10%
5	0V = GND		0 V input referenced to the GND potential on the amplifier housing	Consumption: 0.320A UL: protection by means of 4 A UL fuse

X1 CONNECTOR: RESOLVER Sub D 15 pins female

Pin	Symbol	Description
1	Shield conn.	SIN, COS, EXTC shield coupled together
2	COS +	CMZ-SMB/MB Motors series
3	SIN -	CMZ-SMB/MB Motor series
4	EXTC -	CMZ-SMB/MB Motor series
5	EXTC +	CMZ-SMB/MB Motor series
10	COS -	CMZ-SMB/MB Motor series
11	SIN +	CMZ-SMB/MB Motor series
12	TC	If motor thermal switch connected to X1
13	TC	If motor thermal switch connected to X1
7	5 VOUT	Output
8	GND	Output
9	Reserved	Output
14	I2C-SCL	BUS I2C
15	I2C-SDA	BUS I2C

X6-X7 CONNECTOR: FIELDBUS IN / OUT

Standard connectors RJ45

LBD CANopen bus drive version

Pin	Symbol	Description
2	CAN-L	Line CAN-L (dominant low)
3	GND	CAN ground
1	CAN-H	Line CAN-H (dominant hight)
6-7-8	GND	

LBD EtherCAT bus drive version

Pin	Symbol	Description
1	Tx Data +	Differential signals
2	Tx Data -	
3	Rx Data +	Differential signals
6	Rx Data -	

X2 CONNECTOR: INPUTS-OUTPUTS Sub D 15 pins male

Pin	Symbol	I/O	Description
1	+VIN_AN1	I	Analog input n°1 Differential input +/-10 V Input impedance: 20 kOhms
10	-VIN_AN1	I	
2	GND_AN2		Non differential analog input n° 2 Direct input +/-10 V / GND reference
11	+VIN_AN2	I	
4	AOK-	O	OptoMos relay: high output impedance if fault Umax = 50 V , Imax = 300 mA Polarity must be observed: AOK+ = positive potential AOK- = negative potential
14	AOK+	O	
13	GND		External supply for Hall sensor different from encoder +5 V.
3	+VEXT_EH (External supply: max. 24 Vdc / max.300 mA)	I	
5	OUT1	O	Non optocoupled DRIVER PNP "high side" logic outputs 24 V / 300 mA
15	OUT2	O	
6	OUT3	O	
16	(Differential encoder output) OUT_TZ-	O	Differential encoder outputs available on the LBD drive version only. 5 V / 60 mA via channels A, B, Z
7	(Differential encoder output) OUT_TZ+	O	
17	(Differential encoder output) OUT_FB-	O	
8	(Differential encoder output) OUT_FB+	O	
18	(Differential encoder output) OUT_FA-	O	
9	(Differential encoder output) OUT_FA+	O	
19	IN_STO2	I	All logic inputs are optocoupled EGND = optocoupled inputs reference Vin voltage = 18 V < Vin < 30 V Input impedance Zin = 10 KOhms Tin input filtre = 20 µs **NOTE: IN5 and IN3 inputs can be used as PULSE and DIRECTION logic inputs (stepper motor emulation).** **The configuration of the Pulse / Direction inputs is software selectable and saved in the amplifier EEPROM**
20	IN_GND		
21	IN_STO1	I	
22	IN5 / PULSE (stepper motor emulation)	I	
23	IN4	I	
24	IN3 / DIR (stepper motor emulation)	I	
25	IN2	I	
26	IN1	I	
12	OUT_AN	O	Analog output 2.5 V +/- 2 V - 8 bits. software configurable analog output

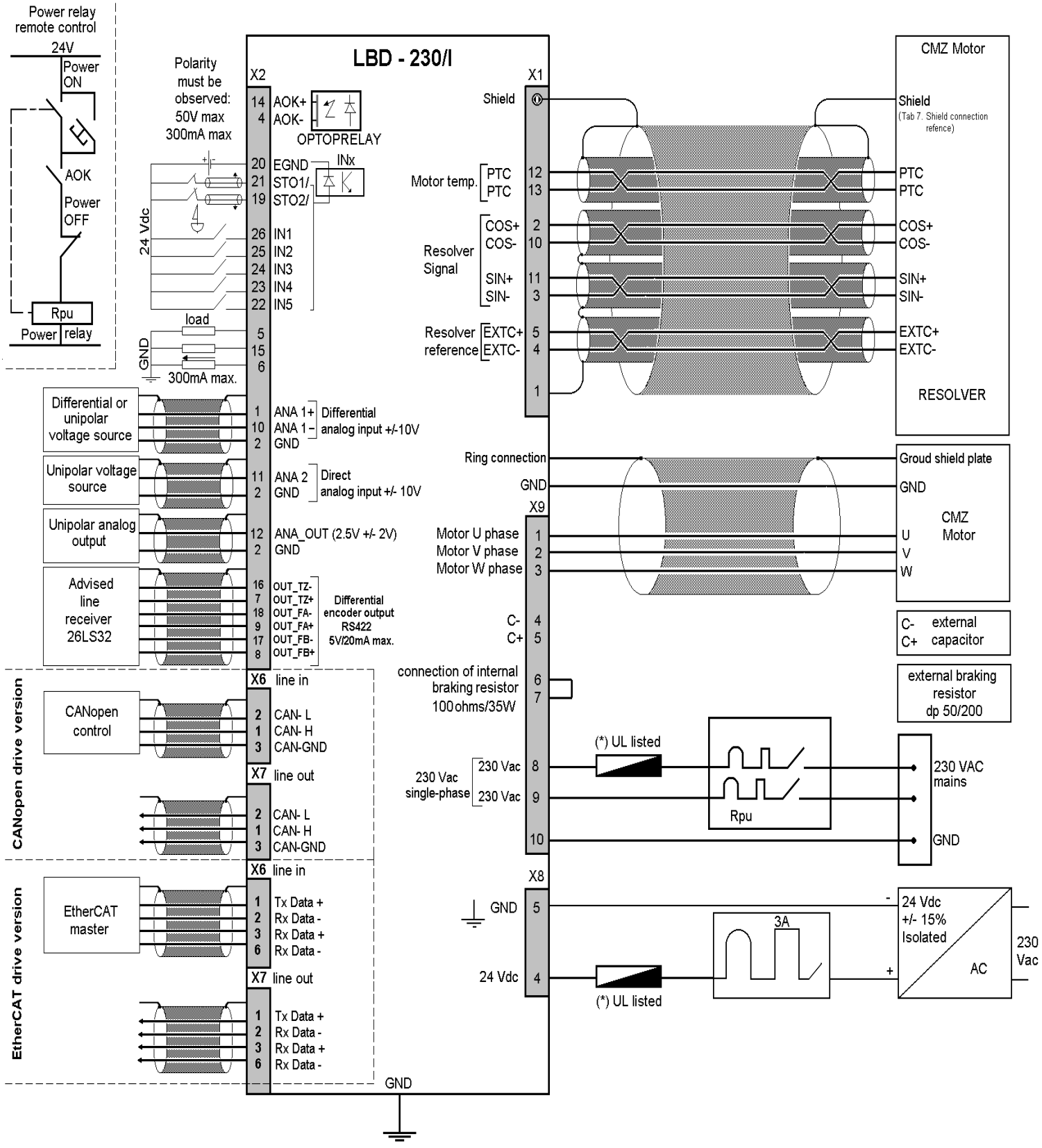
X3 CONNECTOR: ENCODER INPUT/OUTPUT CONFIGURABLE Sub D 15 pin female

Pin	Symbol			Description		
	TTL & HES	Sin/Cos & HES	absolut Hiperface	TTL & HES	Sin/Cos & HES	absolut Hiperface
7	+5 VOUT	+5 VOUT	-	Encoder supply voltage (max. current = 300 mA)	Encoder supply voltage (max. current = 300 mA)	-
16	GND	GND	-	Encoder supply GND +5V	Encoder supply GND +5V	-
6	HALL U	HALL U	-	Hall sensor input signal phase U	Hall sensor input signal phase U	-
15	HALL V	HALL V	-	Hall sensor input signal phase V	Hall sensor input signal phase V	-
23	HALL W	HALL W	-	Hall sensor input signal phase W	Hall sensor input signal phase W	-
24	+VEXT_EH	+VEXT_EH	-	Hall sensor supply voltage ≠ 5 Vdc. Supply wired on X2 connector	Hall sensor supply voltage ≠ 5 Vdc. Supply wired on X2 connector	Hiperface encoder supply voltage Supply wired on X2 connector
16	GND	GND	-	Hall sensors supply GND	Hall sensors supply GND	Supply GND
14	TC	TC	-	Motor thermal sensor input	Motor thermal sensor input	Motor thermal sensor input
5	TC	TC	-	Motor thermal sensor input	Motor thermal sensor input	Motor thermal sensor input
25	-	Mark- channel	-	-	Differential input for the reference pulse of the Sin/Cos encoder channel Mark-	-
26	-	Mark+ channel	-	-	Differential input for the reference pulse of the Sin/Cos encoder channel Mark+	-
17	-	Sin- channel	Sin- channel	-	Differential input for Sin- channel of the Sin/Cos encoder	Differential input of the Hiperface encoder Sin- channel
18	-	Sin+ channel	Sin+ channel	-	Differential input for Sin+ channel of the Sin/Cos encoder	Differential input of the Hiperface encoder Sin+ channel
8	-	Cos- channel	Cos- channel	-	Differential input for Cos- channel of the Sin/Cos encoder	Differential input of the Hiperface encoder Cos- channel
9	-	Cos+ channel	Cos+ channel	-	Differential input for Cos+ channel of the Sin/Cos encoder	Differential input of the Hiperface encoder Cos+ channel
22	TZ-	-	-	Differential input of the encoder marker pulse Z/	-	-
21	TZ+	-	-	Differential input of the encoder marker pulse Z	-	-
3	Channel FA-	-	Data-	Differential input of the encoder channel A/	-	Differential input of the Hiperface encoder Data- channel
12	Channel FA+	-	Data+	Differential input of the encoder channel A	-	Differential input of the Hiperface encoder Data+ channel
4	Channel FB-	-	-	Differential input of the encoder channel B/	-	-
13	Channel FB+	-	-	Differential input of the encoder channel B	-	-

X9 CONNECTOR: MAINS, MOTOR,BRAKING RESISTOR 10 pin male

Pin	Symbol	I/O	Function	Description
5-7		O	Connection of an external braking resistor if the energy dissipation of the resistor is higher than 35 W. Rmin = 50 Ω Pmax = 200 W	Remove the 6-7 connection of X9 and connect the external resistor between pins 5 and 7 of X9. The external braking resistors must be separately controlled. Minimum resistance = 50 Ω type dp 50/200 (50Ω / 200W)
4	C-	I/O	C- connection of an external capacitor box	For applications which operation power is continuous and higher than 650 W for current ratings 5 and 11 A, and higher than 1000 W for current rating 17 A, an additional and external capacitor box is required in order to get a capacitors lifetime longer than 20 000 hours.
5	C+	I/O	C+ connection of an external capacitor box	
6-7	Rin	O	Connection of the internal 100 Ω/35 W braking resistor	Wiring bridge between pins 6 and 7 for the connection of the internal amplifier resistor.
8-9	230 Vac	I	230 Vac single-phase mains input supply	230 Vac single-phase +10% -15% Integrated mains filtre.
10	GND		GND reference potential of the 230 Vac supply cable.	Reference potential of the amplifier housing. 230 Vac mains GND connection.
3	W	O	Motor phase W	Motor cable connection with grounding by means of a screw with nut on the bottom plate, and shield connection by means of a grounded collar on the cabinet reference plate.
2	V	O	Motor phase V	
1	U	O	Motor phase U	

LBD Drive CONNECTION DIAGRAMS



(*) See fuses table for the UL conformity
(**)Curve D circuit-braker
I1s = 10 x In
In = 10 A
Use only copper conductors for the wiring terminations.
The resistor values of the wiring terminations must comply with certified bloc terminal.

NOTE: The 24V and power supply protection on source side must be made by user

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