TEM_20220720_EN V1.1

V1.0	20/07/2022	First Release
V1.1	21/03/2023	Interlock is now Hardwarware & CAN Motor Type 117 and not 1117 in page 3 Added some information about the vehicle on page 2

Curtis

Controller: 1232SE5371 36/48V
350A (máx) 175A (S2-60mn)
115A máx → Imáx = 33% of 350A
Motor Type 117
EM Brake 48V

CLIC on 1232 picture to download Manual

GearBox 1:40.6
Wheel ⌀ 750mm
Full Load weight 800Kg

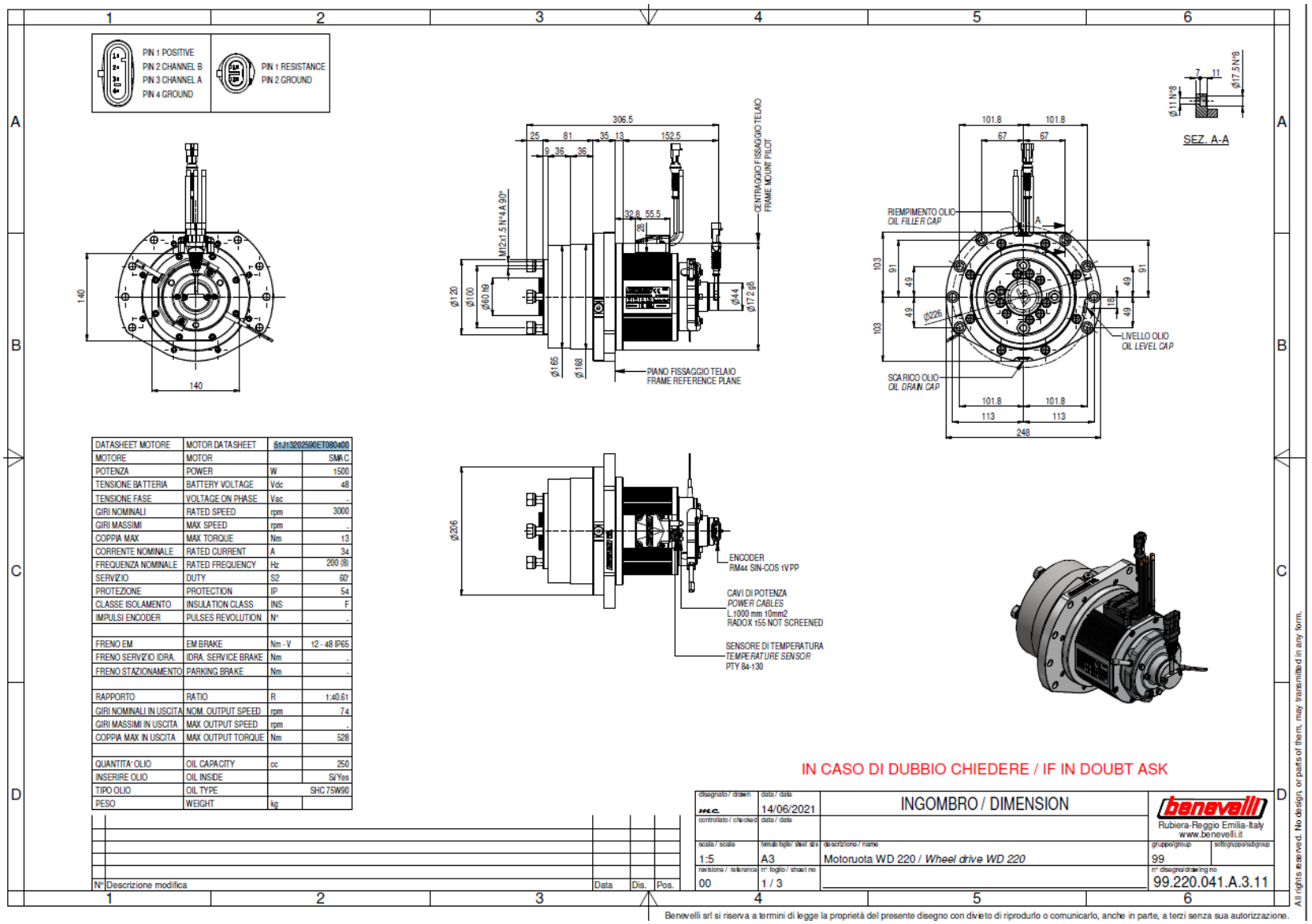
Albright

Main contactor Ref. SU80-5242P 54V CO

SU80 Technical Information

Application	Rating (I_{th}) Interrupted	Uninterrupted
Thermal Current Rating	150A	200A
Intermittent Current Rating:		
30% Duty	275A	365A
40% Duty	235A	315A
50% Duty	210A	285A
60% Duty	195A	260A
70% Duty	180A	240A
Rated Fault Current Breaking Capacity (Icn) 5ms Time Constant:		*(In accordance with UL583*)*
Blowouts	800A at 80V D.C.	
No Blowouts	800A at 48V D.C.	
Rated Fault Current Breaking Capacity (Icn) Resistive Load:		*(In accordance with UL508*)*
Blowouts	300A at 96V D.C.	
No Blowouts	300A at 60V D.C.	
Maximum Recommended Contact Voltages		
Blowouts	96V	96V
No Blowouts	48V	60V
Typical Voltage Drop per pole across New Contacts at 150A	40mV	
Mechanical Durability	> 3,000,000 Cycles	
Coil Voltage Available (Us) (Rectifier board required for A.C.)	6 - 240V	

SMAC132-025-90 48V 51J13202590ET080400 Type 117 1500W 48V 34A S2 60’ EM brake 12Nm 48V



DATASHEET MOTORE	MOTOR DATASHEET	51J13202590ET080400	
MOTORE	MOTOR		SMAC
POTENZA	POWER	W	1500
TENSIONE BATTERIA	BATTERY VOLTAGE	Vdc	48
TENSIONE FASE	VOLTAGE ON PHASE	Vac	.
GIRI NOMINALI	RATED SPEED	rpm	3000
GIRI MASSIMI	MAX SPEED	rpm	.
COPPIA MAX	MAX TORQUE	Nm	13
CORRENTE NOMINALE	RATED CURRENT	A	34
FREQUENZA NOMINALE	RATED FREQUENCY	Hz	200 (8)
SERVIZIO	DUTY	S2	60'
PROTEZIONE	PROTECTION	IP	54
CLASSE ISOLAMENTO	INSULATION CLASS	INS	F
IMPULSI ENCODER	PULSES REVOLUTION	N°	.
FRENO EM	EM BRAKE	Nm - V	12 - 48 IP65
FRENO SERVIZIO IDRA.	IDRA. SERVICE BRAKE	Nm	.
FRENO STAZIONAMENTO	PARKING BRAKE	Nm	.
RAPPORTO	RATIO	R	1:40.61
GIRI NOMINALI IN USCITA	NOM. OUTPUT SPEED	rpm	74
GIRI MASSIMI IN USCITA	MAX OUTPUT SPEED	rpm	.
COPPIA MAX IN USCITA	MAX OUTPUT TORQUE	Nm	528
QUANTITA' OLIO	OIL CAPACITY	cc	250
INSERIRE OLIO	OIL INSIDE		Si'Yes
TIPO OLIO	OIL TYPE		SHC 75W90
PESO	WEIGHT	kg	

benevelli ELECTRIC POWERTRAIN SOLUTIONS	**SMAC SERIE** **TECHNICAL DATA SHEET** **3-PHASE SYNCHRONOUS MOTOR**	Code	51J13202590ET080400
		Rev.	00
		Date	17/03/2021
		Page	1 di 2

Motor Rated Power			**1500W**	
Inverter Power Supply			**48Vdc**	

Description		***Symbol***	***Unit***		
Duty		-	-	S2-60min	
Nominal Speed		n_n	*rpm*	3000	
Frequency (N° poles)		*f (2p)*	*Hz*	200.0 (8)	
Costant Voltage		*Ke*	*Vrms/Krpm*	8.5	
Costant Torque		*Kt*	*Nm/Arms*	0.14	
Instant Torque		*Ti*	*Nm*	13.0	
Instant Current		*Ii*	*Arms*	115.0	
Peak Torque	*S2-5min.*	*Tp*	*Nm*	8.2	
Peak Current	*S2-5min.*	*Ip*	*Arms*	68.0	
Rated Torque	*S2-60min.*	*Tr*	*Nm*	4.3	
Rated Current	*S2-60min.*	*Ir*	*Arms*	34.0	
Rotor Inertia		*Jr*	*kg x m^2*	0.008	
Ambient Temperature		*θa*	*°C*	-15 ÷ +40	
Protection Degree		*IP*		IP 54	up to IP67
Insulation Class		-	-	F	
Thermal protection		-	-	KTY 84-130	
Cooling system				Air	

PRELIMINARY

benevelli ELECTRIC POWERTRAIN SOLUTIONS	SMAC SERIE TECHNICAL DATA SHEET 3-PHASE SYNCHRONOUS MOTOR	Code	51J13202590ET080400		
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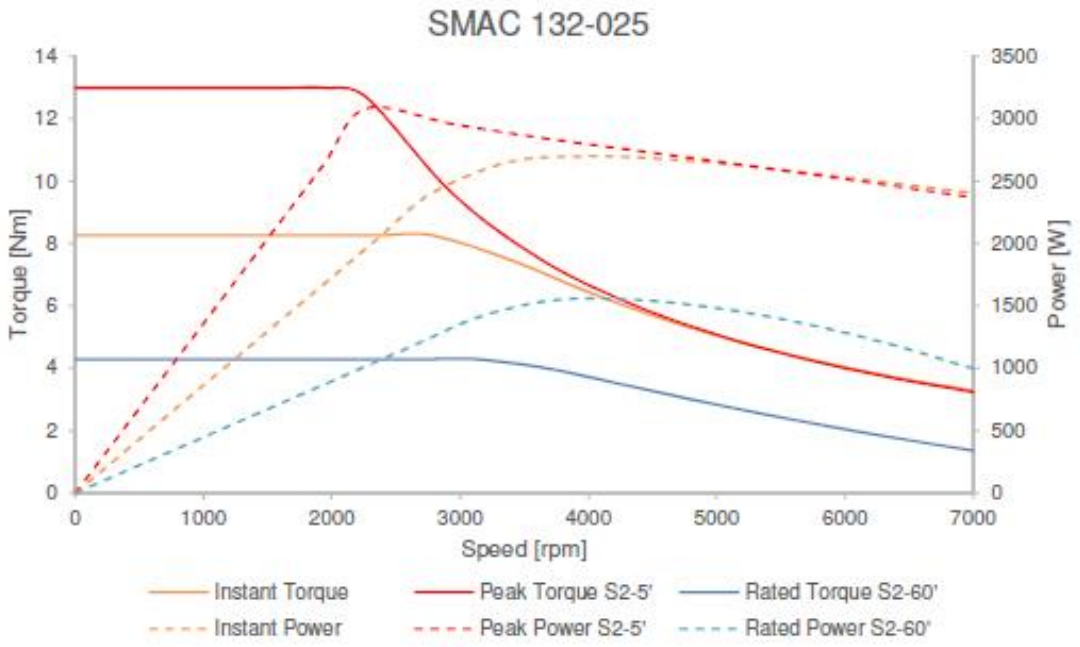
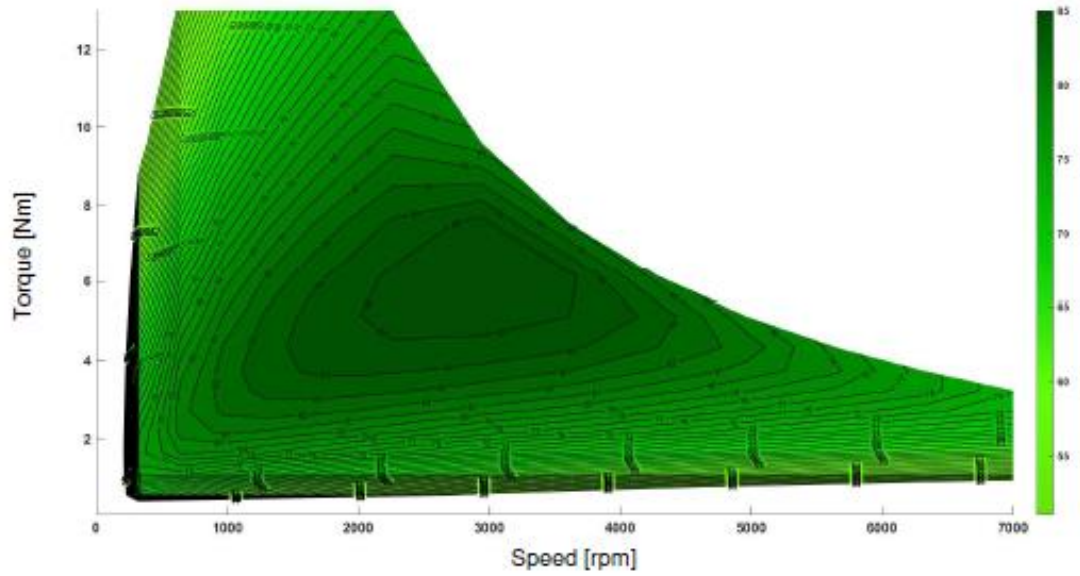
Speed-Torque & Speed Power Motor Curves (*)



Efficiency Map % (*)



* MTPA Field Weakening strategy control & Optimized Advance Angle

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0x200 + Node Id CAN → Traction Controller

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
	CAN_Motor_RPM_Request		CAN_Commands					
	L	H	See Note					
Format	Int 16							
Min/Max	-8000 / +8000 rpm							
	0xE0C0 / 0x1F40							

Speed Can be positive (Forward) or negative (Reverse).

CAN_Commands Note:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						Reset	Interlock

The drive interlock is the result of the interlock bit sent by the CAN and the signal received on the drive pin (Pin J1-9 – Switch 3).

Bit 0 CAN_Commands = 1 AND Pin J1-9 KSI connected to Vbat → DRIVE OK

Bit 0 CAN_Commands = 0 OR Pin J1-9 KSI open → NO DRIVE

0x180 + Node Id Traction Controller → CAN

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
	Controller Temperature		Motor Temperature		Motor rpm		Motor Current RMS	
	L	H	L	H	L	H	L	H
Format	Int 16		Int 16		Int 16		Uint 16	
Min/Max	-100 / +300ºC		-100 / +300ºC		-12000 / +12000 rpm		0.0 / 1000.0 A	
	0xFC18 / 0x0BB8		0xFC18 / 0x0BB8		0xD120 / 0x2EE0		0 / 0x2710	

0x280 + Node Id Traction Controller → CAN

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Status 1	Status 2	Status 3	Status 4	Status 5	Status 6	Status 7	Status 8

If an error occurs in the Traction controller, we can identify it according to the following table:

Status 1 Bit0 = Main Contactor Welded (Code 38) Bit1 = Main Contactor Did Not Close (Code 39) Bit2 = Pot Low OverCurrent (Code 45) Bit3 = Throttle Wiper Low (Code 42) Bit4 = Throttle Wiper High (Code 41) Bit5 = Pot2 Wiper Low (Code 44) Bit6 = Pot2 Wiper High (Code 43) Bit7 = EEPROM Failure (Code 46)	**Status 2** Bit0 = HPD/Sequencing Fault (Code 47) Bit1 = Severe B+ Undervoltage (Code 17) Bit2 = Severe B+ Overvoltage (Code 18) Bit3 = B+ Undervoltage Cutback (Code 23) Bit4 = B+ Overvoltage Cutback (Code 24) Bit5 = Sin/Cos Sensor Fault (Code 88) Bit6 = Controller Overtemp Cutback (Code 22) Bit7 = Controller Severe Undertemp (Code 15)
Status 3 Bit0 = Controller Severe Overtemp (Code 16) Bit1 = Coill Driver Open/Short (Code 31) Bit2 = Coi12 Driver Open/Short (Code 32) Bit3 = Coil3 Driver Open/Short (Code 33) Bit4 = Coi14 Driver Open/Short (Code 34) Bit5 = PD Open/Short (Code 35) Bit6 = Main Open/Short (Code 31) Bit7 = EMBrake Open/Short (Code 32)	**Status 4** Bit0 = Precharge Failed (Code 14) Bit1 = Digital Out 6 Overcurrent (Code 26) Bit2 = Digital Out 7 Overcurrent (Code 27) Bit3 = Controller Overcurrent (Code 12) Bit4 = Current Sensor Fault (Code 13) Bit5 = Motor Temp Hot Cutback (Code 28) Bit6 = Parameter Change Fault (Code 49) Bit7 = Motor Open (Code 37)
Status 5 Bit0 = External Supply Out of Range (Code 69) Bit1 = Motor Temp Sensor Fault (Code 29) Bit2 = VCL Run Time Error (Code 68) Bit3 = +5V Supply Failure (Code 25) Bit4 = OS General (Code 71) Bit5 = PDO Timeout (Code 72) Bit6 = Encoder Fault (Code 36) Bit7 = Stall Detected (Code 73)	**Status 6** Bit0 = Bad_Calibrations_Fault (Code 82) Bit1 = [Not Used] Bit2 = Emer Rev HPD (Code 47) Bit3 = [Not Used] Bit4 = Motor Type Fault (Code 89) Bit5 = Supervisor Fault (Code 77) Bit6 = Motor Characterization Fault (Code 87) Bit7 = [Not Used]
Status 7 Bit0 = [Not Used] Bit1 = VCL/OS Mismatch (Code 91) Bit2 = EM Brake Failed to Set (Code 92) Bit3 = Encoder LOS (Limited Operating Strategy) (Code 93) Bit4 = Emer Rev Timeout (code 94) Bit5 = Dual Severe Fault (Code 75) Bit6 = Fault On Other Traction Controller (Code 74) Bit7 = Illegal Model Number (Code 98)	**Status 8** Bit0 = [Not Used] Bit1 = [Not Used] Bit2 = [Not Used] Bit3 = Parameter Mismatch (Code 99) Bit4 = Severe KSI Undervoltage (Code 17) Bit5 = [Not Used] Bit6 = [Not Used] Bit7 = Encoder Pulse Count Fault (Code 88)

Note: See also ***User Fault 1*** & ***Status 9*** in next TxPDO (0x380 + Node Id).

0x380 + Node Id Traction Controller → CAN

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
	Capacitor Voltage		Keyswitch Voltage		Status 9	User Fault 1		
	L	H	L	H	See Note 1	See Note 2		
Format	UInt 16		UInt 16					
Min/Max	0.0 / 200.0V		0.0 / 105.0V					
	0x0000 / 0x3200		0x0000 / 0x2904					

Note1: Status 9

Bit0 = Supervisor Incompatible (Code 78)
Bit1 = [Not Used]
Bit2 = [Not Used]
Bit3 = PMAC Commissioning Needed (Code 19)
Bit4 = [Not Used]
Bit5 = [Not Used]
Bit6 = Driver Supply (Code 83)
Bit7 = [Not Used]

Note 2: User Fault 1:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
							VCL Fault 1

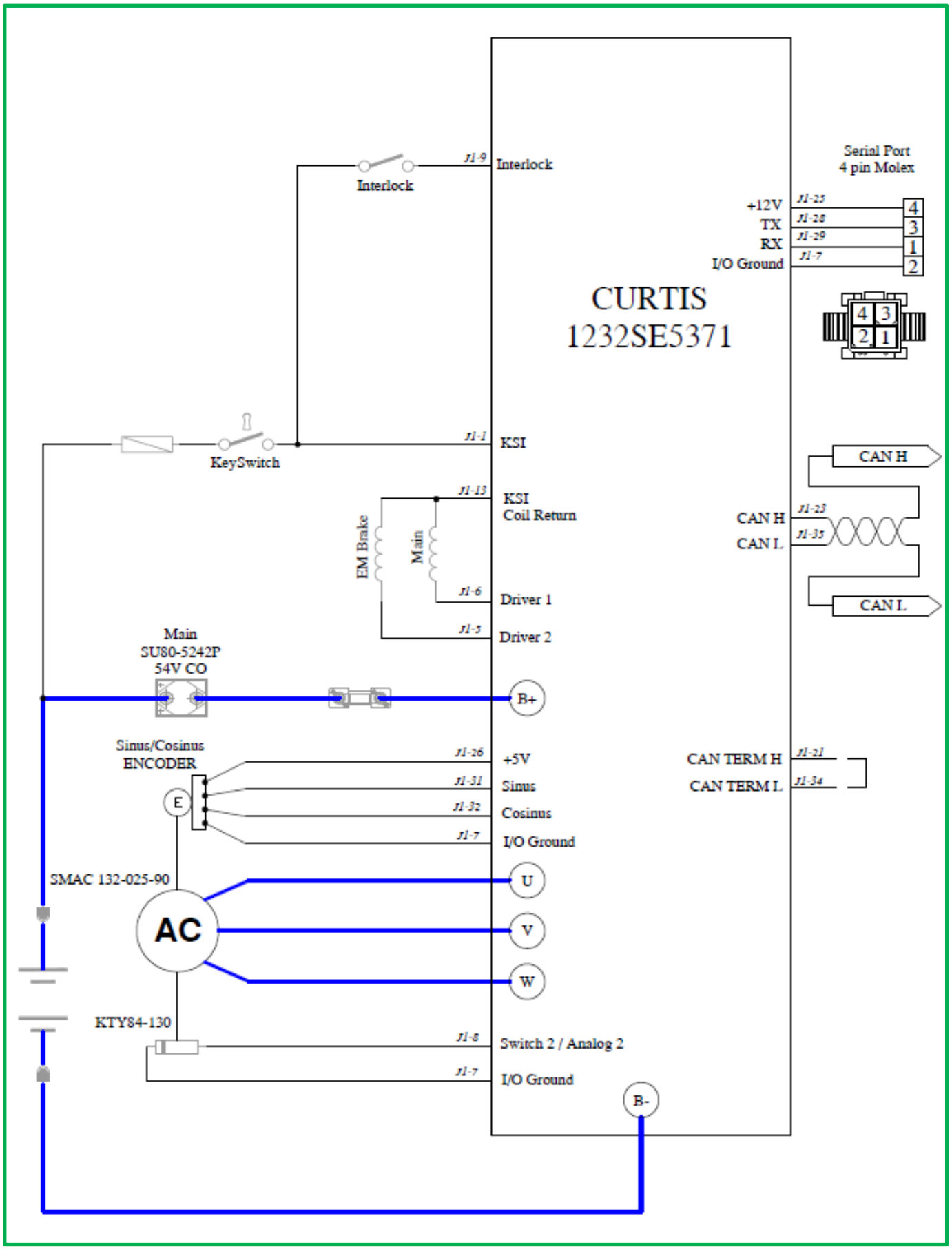
VCL Fault 1 (code 51) PDO from ECU is Time out.

- Shutdown_Throttle
- Shutdown_Interlock
- Shutdown_EMBrake
- Full_Brake

0x700 + Node Id NMT Traction Controller

0x80 + Node Id EMCY Traction Controller

Ver documento “NTJP20161130 EMCY en 123x.pdf“ para la explotación de este Mensage.


CURTIS
1232SE5371
Serial Port
4 pin Molex
+12V
TX
RX
I/O Ground
J1-25
J1-28
J1-29
J1-7
4
3
1
2
Interlock
J1-9
Interlock
KeySwitch
J1-1
KSI
J1-13
KSI
Coil Return
EM Brake
Main
J1-6
Driver 1
J1-5
Driver 2
CAN H
CAN L
J1-23
J1-35
Main
SU80-5242P
54V CO
B+
Sinus/Cosinus
ENCODER
E
J1-26
+5V
J1-31
Sinus
J1-32
Cosinus
J1-7
I/O Ground
CAN TERM H
CAN TERM L
J1-21
J1-34
SMAC 132-025-90
AC
U
V
W
KTY84-130
J1-8
Switch 2 / Analog 2
J1-7
I/O Ground
B-