



Operation & Maintenance Manual

NO20NS
NO20NSP
NO10NSF
NO10NSFP

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13	EEPROM KO	(Warning)	Stored
	It's due to a hardware or software defect of the non-volatile embedded memory supporting the controller parameters. This alarm does not inhibit the truck operations, but the truck will work with the default values. Try to execute a CLEAR EEPROM operation. Switch the key off and on to check the result. If the alarm occurs permanently, it is necessary to replace the Combiac1 controller. If the alarm disappears, the previously stored parameters will have been replaced by the default.		
19	LOGIC FAILURE #1	(Alarm)	Stored
	This fault is displayed when the controller detects an overvoltage or undervoltage condition. Overvoltage threshold is 45V; undervoltage threshold is 9V in the 24V controller. If fault displayed at startup or in standby; in this case it is due to an undervoltage, so it is important to check following: a) Key input signal down going pulses (below undervoltage threshold) due external loads, like DC/DC converters starting up, relays or contactors energizing/ denenergizing. b) If no voltage transient is detected on the supply line and the alarm is present every time the key is switched ON, the fault is in the Combiac1 controller. If fault is displayed during motor driving; in this case due to an undervoltage or an overvoltage condition. a) If the alarm happens during traction acceleration or driving hydraulic functions, the fault is an undervoltage condition; check battery charge level and power cable connections. b) If the alarm happens during release braking, the fault is an overvoltage condition; check line contactor tips and battery power cable connections.		
28	PUMP VMN LOW	(Alarm)	Stored
	Cause: The pump motor output is lower than expected, considering the pulswidthmodulation applied.		

141	Steering Fault	Continuous over current. Check free rotation of steering motor. If ok, replace steering controller. Stop mode active.
142	Steering Fault	Charging timeout. Key input (XA3_1/1) is not reaching battery positive voltage within 10 sec from the start up. Check wiring from fuse (8F1). Stop mode active.
143	Steering Fault	Key input (XA3_1/1) voltage above defined (68,74V) high voltage level. Measure voltage from fuse 8F1. (Software limit) Stop mode active.
144	Steering Fault	Key input (XA3_1/1) voltage above defined (68,74V) high voltage level. Measure voltage from fuse 8F1. (Hardware limit) Stop mode active.
145	Steering Fault	Key input (XA3_1/1) voltage below defined (15,6V) low voltage level. Measure from fuse 8F1. Stop mode active.
146	Steering Fault	Motor temperature is too high. Let the motor cool down, if fault still persist check also the resistance of thermal sensor from connector (XA3_1) between pins 16 and 4. The resistance of the sensor is 580 ohms at 0°C. Stop mode active.
147	Steering Fault	Motor temperature is too high. Let the motor cool down, if fault still persist check also the resistance of thermal sensor from connector (XA3_1) between pins 16 and 4. The resistance of the sensor is 580 ohms at 20 °C. Stop mode active.
148	Steering Fault	Steering controller temperature is above defined alarm level. Stop mode active.
149	Steering Fault	Steering controller (A3) internal 15V supply voltage is too low. Can not be measured, replace the steering controller. Stop mode active.
150	Steering Fault	Steering controller (A3) internal 5V supply voltage is too low. Can not be measured, replace the steering controller. Stop mode active.
151	Steering Fault	Offset for the current measurement is too high. Offset is adjusted automatically on truck power on (steering is powered on after K2 main contactor). Steering controller current sensor fault. Replace steering controller. Stop mode active.
152	Steering Fault	Steering controller (A3) open drain output (XA3:1/21) current is too high. Open drain is used for as magnetic brake output. Check wiring and magnetic brake coil for short/broken circuit, if ok, replace steering controller. Stop mode active.
154	WGU	No CAN messages received from the wire guidance unit (A8) to logic board (A5), CAN bus wiring should be checked if fault persist replace wire guidance unit. Normal Mode active.
155	Steering Fault	Can Open communication timeout. Check CAN bus wiring. Restart truck. If fault still persist, replace steering controller (A3). Stop mode active.
156	Steering Fault	Steering reference sensor (S31, S34) was not detected within 100 degrees rotate. Check sensors and wirings. Stop mode active.
157	WGU	Can Open communication timeout. Check CAN bus wiring. Restart truck. If fault still persist, replace wire guidance unit (A8). Stop mode active.
158	Steering Fault	Sensor bearing (B33) feedback error, not connected or short circuit. Stop mode active.
159	Steering Fault	Steering calibration (Cam Calibration, Par 253) did not complete within certain time period (2 sec.) Stop mode active.
160	Steering Fault	During calibration an error happens, mostly when the steering feedback sensors (S31, S34) gets loose and never finds the cam within certain angle. Stop mode active.
161	Steering Fault	Steering feedback sensor (S31,S34) error, not connected or short circuit. Stop mode active.
162	Steering Fault	Steering wheel sensor (B11) error, not connected or short circuit. Stop mode active.
163	Steering Fault	Difference between set and actual value for motor output current are outside the limit. Check free rotation of steering motor. If ok, replace steering controller. Stop mode active.

201	Logic fault	Alarm has caused truck to go into low performance mode. (See alarm list) Normal Mode active.
202	Logic fault	Alarm has caused truck to go into stop mode. All functions are disabled (See alarm list) Normal Mode active.
203	Logic fault	Alarm has caused truck to go into slow performance mode. (See alarm list) Normal Mode active.
204	Normal State	Truck idle timeout has elapsed and the truck has entered the sleep mode. Normal Mode active.
205	Battery Low	Battery level close to minimum. Battery should be charged soon. Slow Mode active.
206	Max. Lifting Height	Mast is at it's defined electrical top position, further lifting is disabled. Normal Mode active.
208	Incorrect Operation	No lifting allowed, because defined maximum weight is exceeded. (Option) Normal Mode active.
210	Traction Fault	Traction controller temperature is above defined warning level (80°C) Normal Mode active.
211	Hydraulic Fault	Pump controller temperature is above defined warning level (80°C) Normal Mode active.
212	Traction Fault	Traction motor temperature is above defined alarm level (90°C) Normal Mode active.
213	Hydraulic Fault	Pump motor temperature is above defined alarm level (90°C) Normal Mode active.
218	Temp. lift/lower limit	Lift/lower has been disabled. Release lift/lower lever to continue. Normal Mode active.
220	Shock Penalty	Shock sensor input has detected shock above defined level 2 and will remain in slow (Option) mode until the defined timeout has elapsed. Slow Mode active.
231	Incorrect Start	Throttle lever not in neutral position in startup. Release lever and check throttle lever (B300) or wiring. Stop mode active.
233	Incorrect Start	Lift/lower lever or service button activated at start-up Stop mode active.
234	Incorrect Operation	Lift/lower lever activated before dead man pedal. Stop mode active.
239	Incorrect Start	Foot switch activated at start-up Stop mode active.
240	Incorrect Start	Option switch, horn button or initial lift button activated at start-up. Check correct configuration for option switch (parameter 15 Option BITS, bit 15) and option switch S309 or wiring. Check also horn and initial lift buttons and wiring. Stop mode active.
241	Incorrect Start	Safety switch activated at start-up. Check switch S306 (and S308 if present) or wiring. Normal Mode active.

controlled safety switch to close. Therefore, traction is disabled.
ABSENT: Inhibit supervisor microprocessor functions (Not in use!).
PRESENT: Enable diagnostic interaction between the main and supervisor microprocessors.
Factory default is "PRESENT". Do not change the default value!

ENCODER CONTROL

This parameter is not used in this application. Factory default value is "OFF". Do not change the default value!

FEEDBACK DEVICE

This parameter controls what kind of feed back device is used.
Factory default value is "OP #4". Do not change the default value!

AUTOCENTERING

This parameter controls the automatic steering centring at key-on. Value range setting:
ON: The steering centring is activated at key-on.
OFF: The steering centring is not activated at key-on.

RECOVERY AT REST

This parameter controls the steering recovery at rest, which is not used in this application. Factory default is "OFF". Do not change the default value!

AUX FUNCTION 1

This parameter sets the steering mode after the feedback signals has reached the final position. The steering motor is turned on when a travel demand is active. Factory default setting is "0". Do not change the default value!

DIAG MOTOR TEMP

This parameter controls the steering motor overheating alarm (MOTOR TEMPERAT) enabling or disabling. ON: the detection of the alarm. OFF: Disables the detection of the alarm. Factory default setting is "ON". Do not change the default value!

SUBMENU: SET MODEL

SYSTEM CONFIG

MAX EVP2	-	-	60								68.2	0-100	Proportional valve maximum voltage for forks lower
MIN EV1	6.3	6.3	6.3								6.3	0-100	Not in use.
MAX EV1	97.6	97.6	97.6								97.6	0-100	Not in use.
EVP OPEN DELAY	1	1	1								1	0,1-5	Proportional valve opening valve. 0,1 = fastest
EVP CLOSE DELAY	0.5	0.5	0.1								2	0,1-5	Proportional valve closing ramp. 0,1 = fastest
EVP2 OPEN DELAY	-	-	1								x	0,1-5	Proportional valve opening valve. 0,1 = fastest
EVP2 CLOSE DELAY	-	-	0.1								x	0,1-5	Proportional valve closing ramp. 0,1 = fastest
EV1 OPEN DELAY	1	1	1								1	0,1-5	Not in use.
EV1 CLOSE DELAY	2	2	2								2	0,1-5	Not in use.
CONFIG MENU/ SET MODEL:													
CONNECTED TO	5	5	5								5	5	2 = traction controller, 5 = pump controller, 6 = steering controller, 10 = encoder card
SET OPTIONS:													
HOURLY COUNTER	RUNNING	RUNNING	RUNNING								RUNNING		Factory setting
EVP TYPE	DIGITAL	DIGITAL	ANALOG								DIGITAL		Proportional valve output type, analog = proportional, digital = on/off
EV1 TYPE	DIGITAL	DIGITAL	DIGITAL								DIGITAL		Proportional valve output type, analog = proportional, digital = on/off
SET TEMPERATURE	NONE	NONE	NONE								NONE		Factory setting
AUX OUTPUT #6	7	7	7								3		Output XA1/14 0 = disabled 1 = Drive Forward active 2 = Drive Backward active 3 = Drive Forward OR Backward active 4 = Lift active 5 = Lower active 6 = Lift OR Lower active 7 = Forward OR Backward OR Lift OR Lower active

AUTO REQ TYPE	0	0	0	0							0		Factory setting
CONNECTED TO	EPS	EPS	EPS	EPS							EPS		2 = traction controller, 5 = pump controller, 6 = steering controller, 10 = encoder card
MODEL TYPE	x	x	x	x							x		
ADJUSTMENTS:											0		
ADJUSTMENT #01	0	0	0	0							0		Factory setting
SET CURRENT	0	0	0	0							0		Factory setting
ADJUSTMENT #02	x	x	x	x							90		Factory setting
ADJUSTMENT #03	x	x	x	x							x		Factory setting
ADJUSTMENT #04	x	x	x	x							x		Factory setting
SET BATTERY TYPE	24V	24V	24V	24V							24V		Factory setting
SET SAT. FREQ.	90 Hz	90 Hz	90 Hz	90 Hz							90Hz		Factory setting
OVERSAT FREQ.	1 Hz	1 Hz	1 Hz	1 Hz							1Hz		Factory setting
MAXIMUM SLIP	5,00 Hz	5,00 Hz	5,00 Hz	5,00 Hz							5Hz		Factory setting
AUX VOLTAGE #1	x	x	x	x							x		Factory setting
AUX VOLTAGE #2	x	x	x	x							x		Factory setting
NO LOAD CURRENT	24 A	24 A	24 A	24 A							24A		Factory setting
ZERO SP POT	x	x	x	x							x		Factory setting
SET STEER 0-POS.	x	x	x	x							x		Straight ahead steering position adjustment
SET STEER 180	x	x	x	x							x		Factory setting
SET ENC AT 180	x	x	x	x							x		Autoteaching sets this parameter. Value is about 1,6 - 1,7V
SET ENC AT 360	x	x	x	x							x		Autoteaching sets this parameter. Value is about 3,3 - 3,4V
SPECIAL ADJUST:											0		
SET TEMPERATURE	x	x	x	x							x		Factory setting
HIGH ADDRESS	0	0	0	0							0		Factory setting
DEBUG OUTPUT	15	15	15	15							15		Factory setting
HARDWARE SETTINGS:											0		
MAXIMUM CURRENT	50 A	50 A	50 A	50 A							50A		Factory setting
CAN BUS	PRESENT	PRESENT	PRESENT	PRESENT							PRESENT		Factory setting
SET HI RESOL AD	1	1	1	1							1		Factory setting
AUTOTEACHING	OFF	OFF	OFF	OFF							OFF	ON / OFF	OFF = Automatic teaching for steering disabled. ON = Automatic steer teaching activated on next truck startup.
AUX FUNCTION 11	5	3	5	5							x		Defines steering motor and feedback sensors positions

Repairs and structural modifications

Do not modify the truck without the manufacturer's express permission. Do not add or remove, weld or bend any parts, as the modifications could affect the operation of the truck and might weaken its construction.

NOTE

Only in the event that the truck manufacturer is no longer in business and there is no successor in the interest to the business, the user may arrange for a modification or alteration to a powered industrial truck, provided, however, that the user shall:

- *arrange for the modification or alteration to be designed, tested and implemented by an engineer(s) expert in industrial trucks and their safety;*
- *maintain a permanent record of the design, test(s) and implementation of the modification or alteration;*
- *approve and make appropriate changes to the capacity plate(s), decals, tags and instruction handbook;*
- *affix a permanent and readily visible label to the truck stating the manner in which the truck has been modified or altered together with the date of the modification or alteration, and the name and address of the organization that accomplished the tasks.*

Overhead guard and load support (applies only to trucks with mast)

Trucks driven sitting or standing that are capable of lifting a load higher than 1.8 m must be equipped with an overhead guard. Modifications to the overhead guard that could possibly weaken its structure are not allowed. If it is possible for objects to fall through the openings in the overhead guard, the size of the openings must be reduced. Trucks used for transporting small objects or unstable loads must be equipped with a load support.

Full Version Available

Caterpillar NO20NS Order Picker Operator Manual (SWHOU-00111)

Caterpillar NO20NS Order Picker workshop guide, covers hydraulics, lift system, wiring, battery, and diagnostics. Downloadable PDF format.

[VIEW THE FULL MANUAL](#)