TWINCA
DUMPER

User manual E-500/E-500 slim

Contents

TWINCA A/S | Nr. Bjertvej 14 | DK-7830 Vinderup | VAT no.: 25 80 49 29 | mail@twinca.dk | Tlf.: +45 9744 8555 | www.twincadumper.com

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1 How to operate the machine

Twinca mini dumper is for transportation of primarily soil, granulates, stone, concrete and organic materials.

Twinca dumper has a unique ergonomic steering system. It is easy to manoeuvre in a way that hard physical strain during operation of heavy loads is minimised.

Twinca dumper makes the work on the site easier. Can manage anywhere and there is no need for dock plates, not even when driving on uneven terrain.

Twinca dumper is particularly suitable for landscape gardeners, contractors, farmers, sextons, municipal service divisions and rental companies.

2 Environmental protection

 For the protection of the environment, it is important that discarded machine parts and accessories be delivered to relevant recycling depots, as the machine contains reusable materials.

Machine parts	Material
Steering wheel	Steel
Frame	Steel
Battery	2 x 12 V / 80 Ah
Hydraulic gear pump	Aluminium and steel
Variable hydraulic pump	Steel and brass
Dump bed	Steel
Other parts	Steel and aluminium

Since the noise level of the machine is less than 70 db(A), the noise level has not been measured.

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3 Technical data

	Data
Width (mm)	800/750 Slim
Length (mm)	2050
Height (dump bed)/control lever)(mm)	950/1140
Lifting height/height tilt point (mm)	1900/490
Driving conditions	
Terrain	600 kg
Solid ground	800 kg
Maximum speed - forwards (km/h)	6
Maximum speed - backwards (km/h)	6
Bed capacity - loading volume (l)	200
Bed capacity - maximum volume (kg)	500
Machine weight (kg)	273
Noise level (dB(A))	<70
IP Code	IP44
Battery 500386	2 x 12V/80Ah
Hydraulic oil	832 WRHV

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4 Personal safety

For your own personal safety and the safety of your surroundings, it is important that you read and understand the user manual. It is the responsibility of the user to perfectly understand the manual to ensure the correct use and safe operation of the machine.
If you feel uncertain as to the correct handling and use of the Twinca Dumper, it is important that you get in contact with the seller or Twinca A/S.

 Warning Faulty maintenance could be risky. Read and understand this section before carrying out any kind of maintenance, service or repair of the machine.

- This machine is very heavy and should not be lifted without assistance. **Get help** and use a suitable lifting appliance.
- Keep the working area free and make sure that persons without affiliation to the working process are at a safe distance from the machine and the working area.
- The user should wear personal protective equipment when required.
- Be sure that you know how to switch off the machine before you turn it on, in case you get into some kind of trouble during the operation of the machine.
- Always switch off the engine before transportation or servicing/repair of the machine.
- Never modify or remove safety devices which have been mounted in order to ensure your personal safety. It is important that you check the correct functioning of the safety devices. If such devices are defective or missing – **DO NOT OPERATE THE TWINCA DUMPER** until the safety devices have been restored or repaired.
- Do not operate the machine if you are ill, feel tired or are under the influence of alcohol or drugs.
- Never stand on the machine at any time.
- Do not use the Contractor mini dumper for transportation of people or animals.
- Driving downhill should always be done while reversing.
- Walk carefully around the machine, as the dump bed has sharp edges.
- **Make sure that the dump bed is always in the lowered position when you leave the machine!**

Personal protective equipment
When operating the machine, always wear suitable personal protective equipment such as safety goggles, safety gloves, ear plugs, dust respirator and safety footwear. Wear the personal protective equipment required for the work to be done. Cover and protect long hair and take off all items of jewellery, as they may become stuck in the moving parts of the machine.

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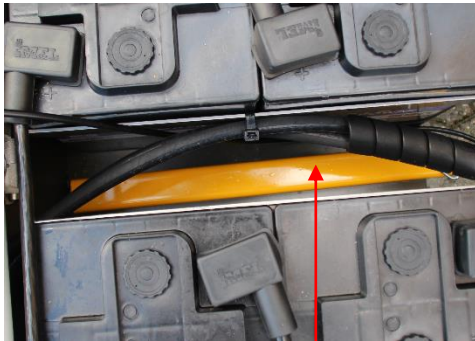
4

4 Personal safety

Always mount the safety devices in front of the cylinder for the dump bed before working on the engine, hydraulic devices and other types of service of the machine.

How to position safety devices when not in use. (fig. 1 pos. 1)
How to position safety devices when in use. (fig. 2 pos. 1)

FIG. 1

FIG. 2

POS. 1

POS. 1

Parking brakes
The parking brake is released automatically during operation of the machine,
and is automatically activated when the machine stops.
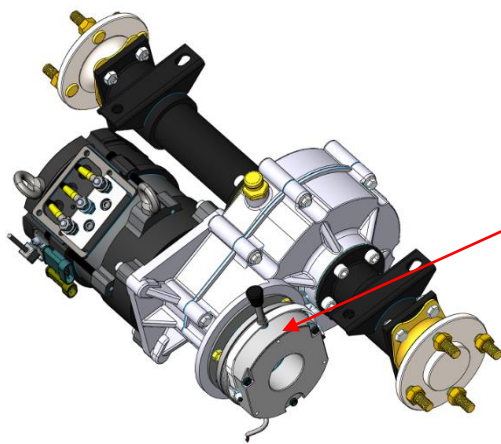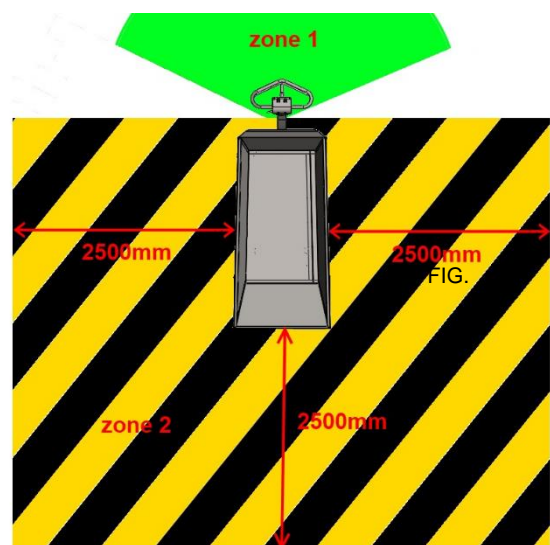
FIG. 3

zone 1

2500mm   2500mm
FIG.

The user is allowed only to be in zone 1.

Because of the risk of being trapped, the user must make sure that nobody is in zone 2 during operation.

zone 2   2500mm

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5 Emergency stop

The emergency stop breaks the electric circuit.

6 Break release

By pulling the cable (pos.1) the break will get released, the power have to be off.

POS.1

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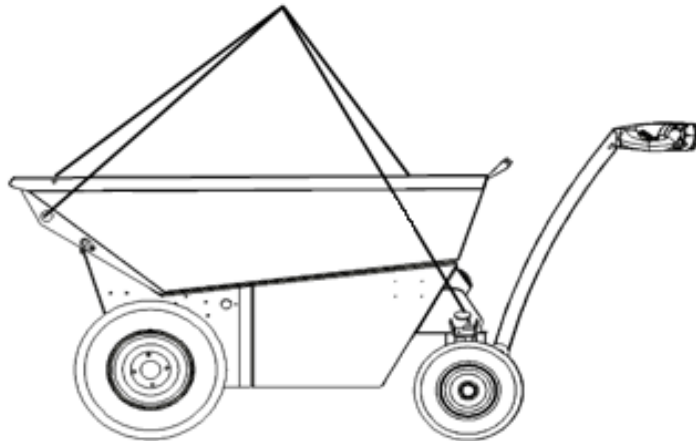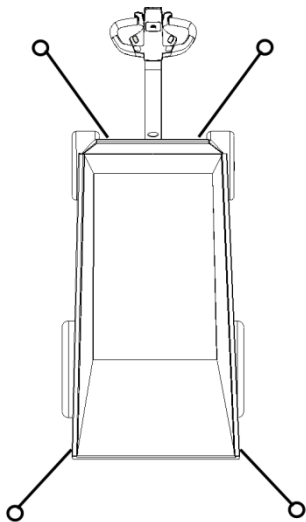
6
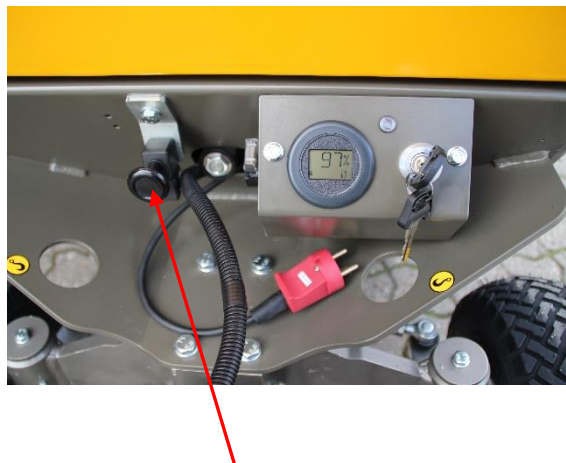
7 Transportation of the machine

Lifting/transportation of the machine.

When lifting the machine, always mount wires or chains in all four lifting points. In this way, you ensure the most stable lifting.
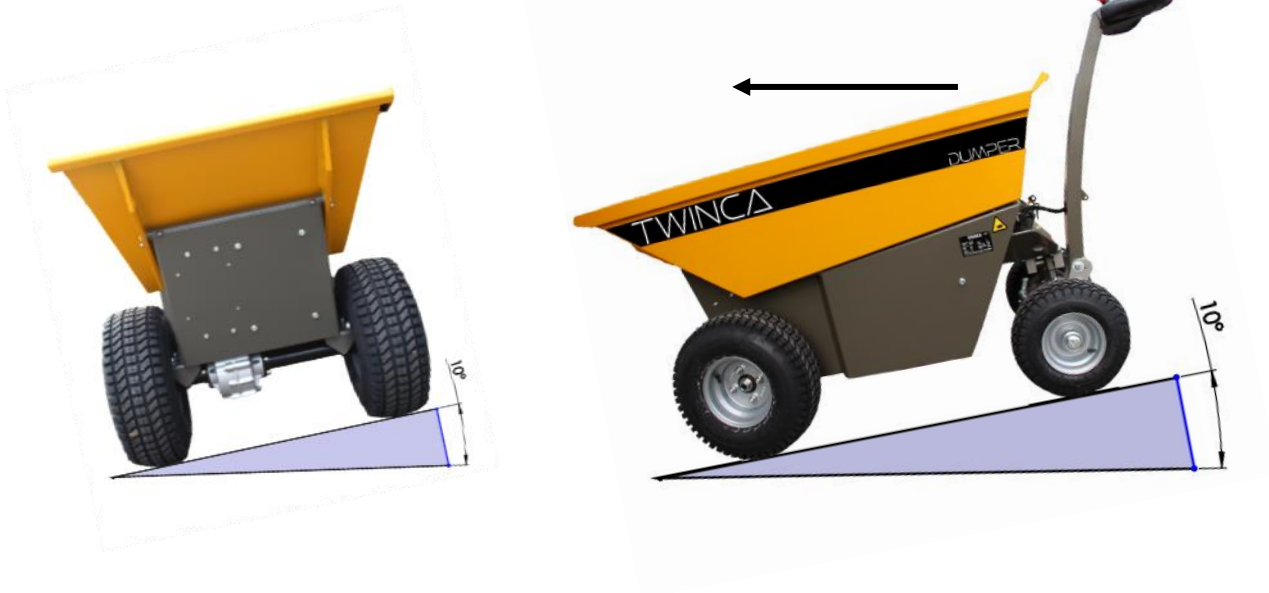

Lashing the machine.

Secure the machine in each of the four lifting points during transportation.

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8 Driving in terrain

The driver always have to be at the highest point when driving downhill.

9 Puncturing

When puncturing bring the machine to stop and be sure the box is completely down.

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10 Check before starting

⚠️

Inspection before starting.
The following inspection before starting describes what is to be checked before starting and what is to be checked after four hours' continuous use. We refer to the service section for a more detailed instruction. In the event of any error, do not use the Twinca dumper until the error has been rectified.

- Check the Twinca dumper thoroughly to locate any sign of faults and imperfections.
- Check that all parts are there and that they function well.
- Check the hydraulic oil level - and fill up if necessary..
- Check the level of acid in the batteries. The liquid should cover all of the cells. Each battery has 3 screw lids for inspection of the acid level. (fig. 1 pos. 1)
- Check the tyre pressures.

FIG. 1
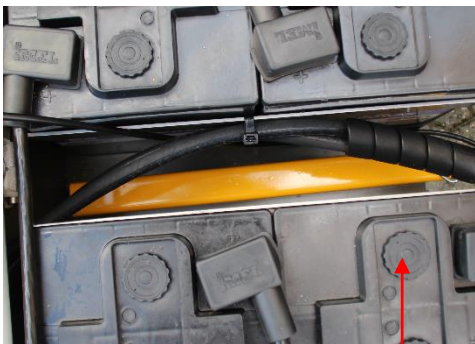
POS. 1

Daily recharging.

Connect to 230V supply.

The machine is inactive as long as the battery charger is activated.
Recharging of the machine is done by connecting a power cable to the connector on the machine.

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11 How to operate the machine

The machine is fully electrically powered. When you deactivate the rocker arm, the machine is slowed to a full stop in the course of 3 seconds.
In order to advance, lift the rocker arm upwards (fig. 1 pos. 2) (forwards).
In order to reverse, press the rocker arm down (fig. 1 pos. 2) (backwards).

NOTE! The parking brake is automatically released when the machine is operated.

Activation of the dump bed.

The switch (fig. 1 pos. 3) controls the hydraulic cylinder.
Press the upper part of the switch and the hydraulic cylinder raises.
Press the lower part of the switch and the hydraulic cylinder descends.

"Belly" function.
When you activate the "belly" function (fig. 1 pos. 1) the operating of the machine is changed to forward driving, away from the driver and then it stops.

Display. (fig. 2 pos. 1)
Indication of operating hours and power level of the batteries.
In the event of an error on the machine, an alarm code is displayed.

Key. (fig. 2 pos. 2)
When you turn the key, the controller of the machine is activated. The operating hours counter is started.

Activation of the Scissors lift (fig. 1 pos. 3).
Press the upper part of the switch and the scissors lift raises.
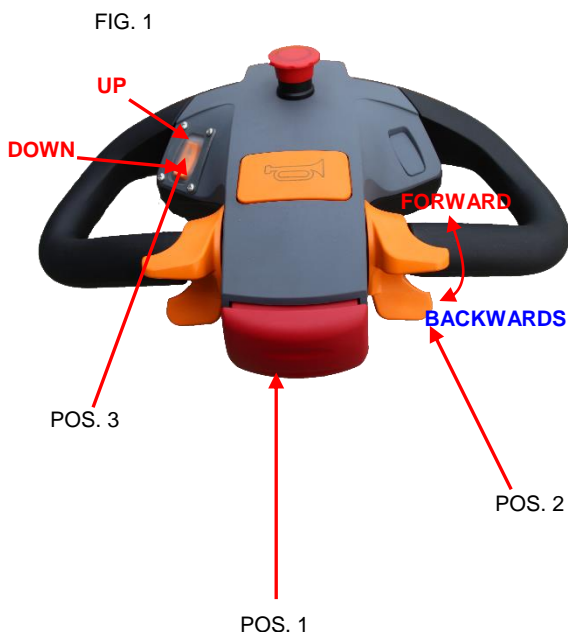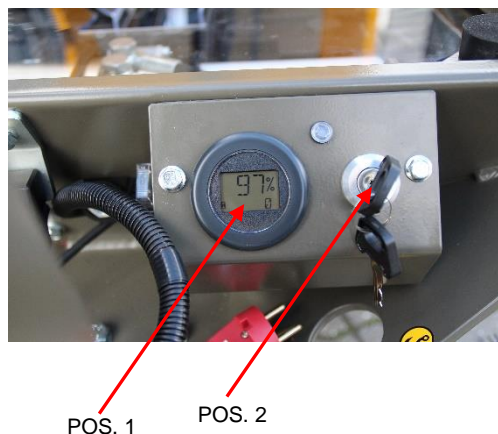Press the upper part of the switch and the scissors lift descends.

FIG. 2

FIG. 1

UP

DOWN

FORWARD

BACKWARDS

POS. 3

POS. 2

POS. 1

POS. 1

POS. 2

11 How to operate the machine

⚠️ **Warning** If it is necessary to drive with a full load down a slope of more than 8% you should turn the machine and reverse down the slope.

How to empty the dump bed

- Stop the machine before you start tipping the dump bed.
- Never lean over the machine when tipping the dump bed.
- Be sure that the contents can slide off easily when the dump bed is tipped.
- Never tip the dump bed when the front of the machine is positioned with the front facing down.
  (As a minimum, a Twinca dumper equipped with scissors lift must stand on a horizontal flat surface.)
- Never stand in front of the machine to release what is stuck in the dump bed.
  Remove what is stuck only when the dump bed is down.
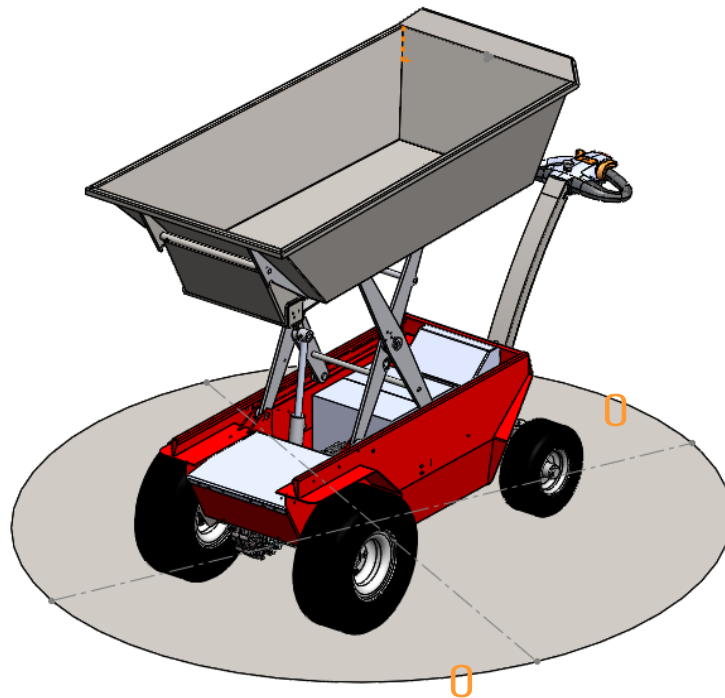
The above figure shows that the surface on which the machine is positioned should be flat (i.e., at zero degrees) when you tilt the dump bed.

MAKE SURE THAT NOBODY IS BESIDE OR IN FRONT OF THE MACHINE DURING OPERATION.

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12 Troubleshooting guide

Problem	Type	Solution
Reduced capacity of the battery.	Battery acid low Battery is worn	Change
The dump bed does not move normally.		
	Missing hydraulic oil	Fill up hydraulic oil. Type: Hydraulic oil 832 WRHV

13 Service and maintenance

Prior to service. Always position the yellow safety devices on the hydraulic cylinder. (fig. 2 pos. 1)
Switch off the current to the machine.

Note - Even though the main switch is off there is still plenty of energy in the batteries!

Hydraulic oil
Change the hydraulic oil once a year. If there is any sign of leakage, switch off the machine and contact your local dealer or Twinca A/S.
Type: Hydraulic oil 832 WRHV

How to clean the machine
For cleaning - use only a brush and water.

Note Never clean the electrical motor with a high-pressure cleaner or a water hose. Use only a cloth or air hose to clean the motor.

FIG. 1

POS. 1

FIG. 2

POS. 1

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13 Service and maintenance

Routine maintenance		Daily	Every 20 hours	Every 50 hours
Greasing points on hydraulic cylinder	To be done		●	
Greasing points on tilting point of the dump bed	To be done		●	
Greasing points on the steering	To be done		●	
Tighten steering bearings	To be done		●	
Check acid in the batteries	To be done			●
Hydraulic oil	Change			once a year
Check tyre pressures	To be done	●		
Safety inspection	To be performed by qualified person			once a year
Gear oil	Change			once a year

Battery.
The machine contains 2 x 12 V / 80 Ah batteries,
which contain lead and acid.
Giving a total voltage level of 24 V.

Position the machine in a ventilated room during charging.

The battery has a cycle of 800-1000 chargings.
If the battery discharges faster than usual it means that the battery should be replaced.
Replace all batteries at the same time.

Charging instructions:

Charge voltage level at 77°F / 25°C	
System voltage	24V
Daily charging	29.6V

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14 Pictographs

Name plate

TWINCA

CE

Serie No.:
Type: Kw:
dB (Lwa):   m/s²:
Bar: Load (kg):
Volt: Weight (kg):
Ah, 5hr: Year:

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Warning signs:

Danger of being trapped

Info signs:

Lashing point

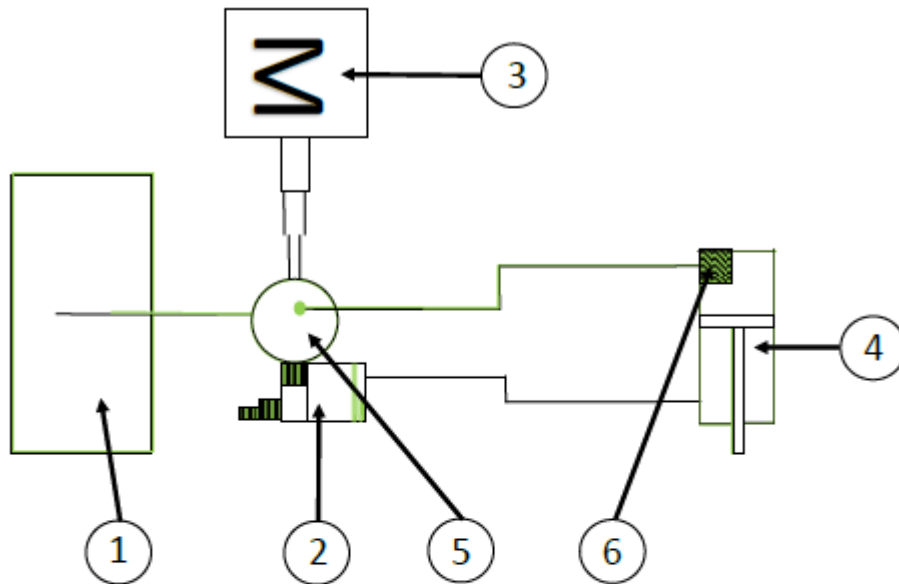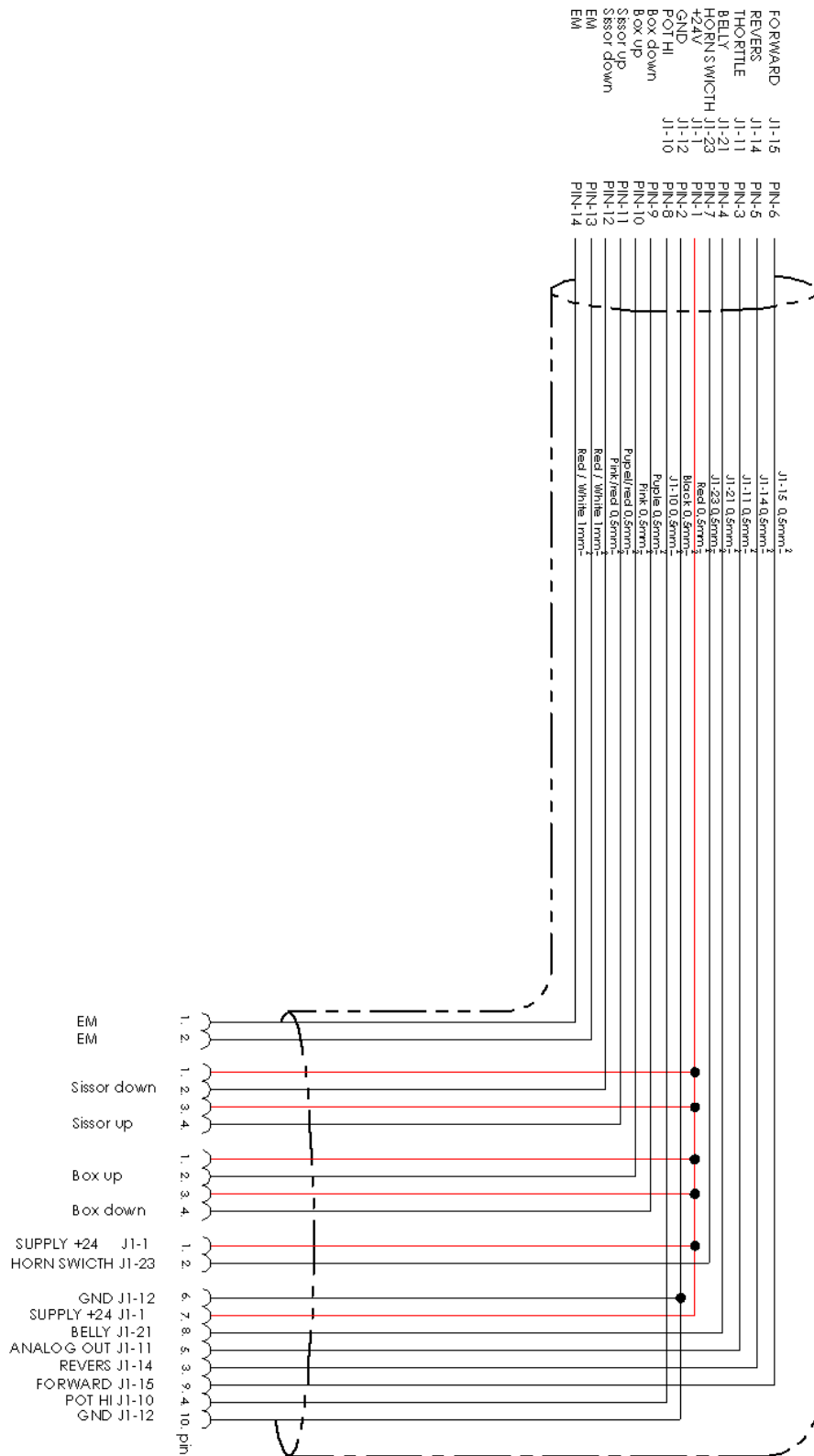TWINCA A/S | Nr. Bjertvej 14 | DK-7830 Vinderup | VAT no.: 25 80 49 29 | mail@twinca.dk | Tlf.: +45 9744 8555 | www.twincadumper.com

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15 Hydraulic diagram

1. Olietank
2. Ventil
3. El-motor
4. Hydraulikcylinder
5. Hydraulikpumpe
6. Slangebrudsventil

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16 Wiring diagram

FORWARD   J1-15
REVERS   J1-14
THORTTLE   J1-11
BELLY   J1-21
HORN SWICTH   J1-23
+24V   J1-1
GND   J1-12
POT HI   J1-10
Sissor up
Sissor down
Box up
Box down
EM
EM

PIN-6
PIN-5
PIN-3
PIN-4
PIN-7
PIN-1
PIN-2
PIN-8
PIN-9
PIN-10
PIN-11
PIN-12
PIN-13
PIN-14

J1-15 0,5mm²
J1-14 0,5mm²
J1-11 0,5mm²
J1-21 0,5mm²
J1-23 0,5mm²
Red 0,5mm²
Block 0,5mm²
J1-10 0,5mm²
Purple 0,5mm²
Pink 0,5mm²
Pink/red 0,5mm²
Pupel/red 0,5mm²
Red / White 1mm²
Red / White 1mm²

EM   1, 2
EM   1, 2
Sissor down   1, 2, 3, 4
Sissor up   1, 2, 3, 4
Box up   1, 2, 3, 4
Box down   1, 2, 3, 4
SUPPLY +24   J1-1   1, 2
HORN SWICTH J1-23   1, 2
GND J1-12   6, 7
SUPPLY +24 J1-1   7, 8
BELLY J1-21   8
ANALOG OUT J1-11   5
REVERS J1-14   3
FORWARD J1-15   9
POT HI J1-10   4
GND J1-12   10, pin

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16 Wiring diagram

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17 Warranty

The warranty for your new Twinca dumper is valid according to the sales warranty for a period of 1 year (12 months) as from the acceptance of the agreement. The warranty of Twinca A/S includes defects as to construction, materials or installation.

The warranty of Twinca A/S does *not* include the following

- Any damage caused by missing maintenance, incorrect use or as a result of the maintenance instructions not being properly followed.

- Amendments, additions or repairs made by others than Twinca A/S or dealers authorised by Twinca A/S.

- Any damage caused by transportation or shipment to or from Twinca A/S or any dealer authorised by Twinca A/S in case of repair or evaluation of claim for damages within the warranty.

- Lost earnings and consequential damages.

- Driving, bridge and road toll and other expenses as to transportation and persons.

The following parts are not covered by the warranty.

- Hydraulic hoses
- Key ignition

Twinca A/S and / or its authorized agents, managers, employees or insurance companies accept no liability for consequential damage or other kinds of damage, loss or expenses relating to or due to or inability to use the machine for any purpose.

Claim form

All warranty claims must be directed to Twinca A/S by telephone, e-mail or in writing.

Contact in case of claim:

Tel: +45 9744 8555 #5   E-mail: RMA@twinca.dk

Contact:
Twinca A/S
Nr.Bjertvej 14
DK-7830 Vinderup

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18 A-declaration:

EU declaration of conformity. appendix II

Manufacturer:

Company name: Twinca A/S
Address   :   Nr.Bjertvej 14
Postal code/City: 7830 Vinderup
Country   :   Denmark
Telephone   :   +45 9744 8555

VAT No.   :   2580 4929

In charge of the technical dossier:

Managing Director: : Klaus Strøm Kristensen

hereby declares, that

Machine:

Mark   :   Twinca dumper

Serial number   :   _____

Type   :   Mini dumper E-500 AC
Was manufactured in accordance with: Maskindirektivet 2006/42/EF

Title   :   Managing Director
Name   :   Klaus S. Kristensen
Company   :   Twinca A/S

Vinderup 1 January 2020

_____
Klaus Strøm Kristensen

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TROUBLESHOOTING CHART INDEX

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1-4	0x14	Precharge Failed	0x2223	
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1-6	0x16	Controller Severe Overtemperature	0x2142	
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10-5	0xA5	Driver 5 Fault	0x2164	
10-8	0xA8	Driver Assignment	0x2632	
11-1	0xB1	Analog 1 Out Of Range	0x2620	
11-2	0xB2	Analog 2 Out Of Range	0x2621	
11-3	0xB3	Analog 3 Out Of Range	0x2622	
11-4	0xB4	Analog 4 Out Of Range	0x2623	
B-5	0xB5	Analog 5 Out Of Range	0x2624	
11-6	0xB6	Analog 6 Out Of Range	0x2625	145
11-7	0xB7	Analog 7 Out Of Range	0x2626	
11-8	0xB8	Analog 8 Out Of Range	0x2627	
11-11	0xBB	Analog 14 Out Of Range	0x262A	
11-12	0xBC	Analog Assignment	0x2631	
12-1	0xC1	Branding Error	0x2860	

Curtis AC F2-A Motor Controller with VCL User Manual – Oct. 2017

Table 16 AC F2-A Controller Troubleshooting Chart

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
1-2 0x12	**Controller Overcurrent** *Controller_Overcurrent_Active* 0x2510 Fault Type(s): 1 = Controller Over Current Phase U 2 = Controller Over Current Phase W 3 = Controller Over Current Phase V 4 = Irms > 135 % Current Limit	1. External short of phase U, V, or W motor connections. 2. Speed encoder noise problems. 3. Motor parameters are mistuned. 4. Controller defective.	*Set:* Phase current exceeded the current measurement limit. *Clear:* Reset Controller	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-3 0x13	**Current Sensor** *Current_Sensor_Active* 0x2832 Fault Type(s): 1	1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective.	*Set:* Controller current sensors have invalid offset reading. *Clear:* Reset Controller	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-4 0x14	**Precharge Failed** *Precharge_Failed_Active* 0x2223 Fault Type(s): 1 Abort 2 Energy Limit Exceeded 3 Time Limit Exceeded	1. An external load on the capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging. 2. See Programmer » System Monitor menu » Controller » Capacitor Voltage.	*Set:* The precharge failed to charge the capacitor bank. *Clear:* Cycle Interlock or *Reset Controller*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-5 0x15	**Controller Severe Undertemp** *Controller_Severe_Undertemp_ Active* 0x2141 Fault Type(s): 1	1. Controller is operating in an extreme environment. 2. See Programmer » System Monitor menu » Controller » Controller Temperature.	*Set:* Heatsink temperature below –40 °C. *Clear:* Bring heatsink temperature above –40 °C. and then *Reset Controller*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-6 0x16	**Controller Severe Overtemp** *Controller_Severe_Overtemp_ Active* 0x2142 Fault Type(s): 1	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller. 4. See Programmer » System Monitor menu » Controller » Controller Temperature.	*Set:* Heatsink temperature above +95 °C. *Clear:* Bring heatsink temperature below +95 °C, and then *Reset Controller*.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-7 0x17	**Severe B+ Undervoltage** *Severe_B_Plus_Undervoltage_ Active* 0x2120 Fault Type(s): 1	1. Non-controller system drain on battery. 2. Battery resistance too high. 3. Battery disconnected while driving. 4. Blown B+ fuse or main contactor did not close. 5. Battery parameters are misadjusted. 6. See Programmer » Monitor menu » Controller » Capacitor Voltage.	*Set:* When Main is closed and FET Bridge enabled: Either the undervoltage drive current cut back = 0 % for 64 ms or the Brownout Voltage is reached. *Clear:* Undervoltage drive current cut back > 0 % for 100 ms <u>and</u> capacitor voltage > brownout voltage.	No drive torque
1-7 0x17	**Severe KSI Undervoltage** *Severe_KSI_Undervoltage_ Active* 0x2122 Fault Type(s): 1	1. Non-controller system drain on battery/keyswitch circuit wiring. 2. Resistance in low power (KSI) circuit is too high. 3. KSI disconnected while driving. 4. Blown fuse. 5. See Programmer » System Monitor menu » Battery » Keyswitch Voltage.	*Set:* When below Brownout Voltage for 2 seconds. *Clear:* Bring KSI voltage above Brownout Voltage.	None, unless a fault action is programmed in VCL.

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
1-8 0x18	**Severe B+ Overvoltage** *Severe_B_Plus_Overvoltage_ Active* 0x2130 Fault Type(s): 1	1. Battery parameters are misadjusted. 2. Battery resistance too high for given regen current. 3. Battery disconnected while regen braking. 4. See Programmer » System Monitor menu » Controller » Capacitor Voltage.	*Set:* Capacitor bank voltage exceeded the Severe Overvoltage limit with FET bridge enabled. *Clear:* Bring capacitor voltage below Severe Overvoltage limit, and then *Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-8 0x18	**Severe KSI Overvoltage** *Severe_KSI_Overvoltage_Active* 0x2132 Fault Type(s): 1	1. Battery-voltage applied to KSI (pin 1) exceeds the Severe Overvoltage limit. 2. See Programmer » Monitor menu » Battery » Keyswitch Voltage.	*Set:* KSI voltage exceeded the Severe Overvoltage limit. *Clear:* Bring KSI voltage below the Severe Overvoltage limit, and then *Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
1-9 0x19	**Speed Limit Supervision** *Speed_Limit_Supervision_ Active* 0x2133 Fault Type(s): 1	1. Motor speed detected exceeding the limit set by the Max Speed Supervision parameter. 2. Misadjusted Max Speed Supervision parameters. 3. See: Programmer » Application Setup » Max Speed Supervision menu.	*Set:* Motor rpm has exceeded the Max Speed Limit setting for the Max Speed Time Limit setting's duration. *Clear:* Reset Controller.	ShutdownInterlock ShutdownEMBrake
1-10 0x1A	**Travel Control Supervision** *Travel_Control_Supervision_ Active* 0x2134 Fault Type(s): 1	1. With the vehicle in the stopped state, the motor frequency and/or phase current detected exceeding the limit set by the Travel Control Supervision parameter. 2. Misadjusted Travel Control Supervision parameters. 3. See: Programmer » Application Setup » Travel Control Supervision menu.	*Set:* The motor frequency and/ or and phase-current are above their Travel Control Supervision settings when in the stopped state. *Clear:* Reset Controller.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
2-2 0x22	**Controller Overtemp Cutback** *Controler_Overtemp_Cutback_ Active* 0x2140 Fault Type(s):1	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller which is preventing controller cooling. 4. Controller is performance-limited at this temperature. 5. See Programmer » System Monitor menu » Controller: Temperature.	*Set:* Controller's Heatsink temperature exceeded 85 °C. *Clear:* Bring heatsink temperature below 85 °C.	Reduced drive torque. Reduced regen braking torque.
2-3 0x23	**Undervoltage Cutback** *Undervoltage_Cutback_Active* 0x2121 Fault Type(s): 1	1. Batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Non-controller system-drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. Blown B+ fuse or main contactor did not close. 7. See Programmer » System Monitor menu » Controller » Currents » UnderVoltageCutback. 8. See Programmer » System Monitor menu » Controller » Capacitor Voltage.	*Set:* Capacitor bank voltage dropped below the UnderVoltageCutback limit with the FET bridge enabled. *Clear:* Bring the capacitor voltage above the controller's UnderVoltageCutback limit.	Reduced drive torque.

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
2-4 0x24	**Overvoltage Cutback** *Overvoltage_Cutback_Active* 0x2131 Fault Type(s): 1	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Programmer » System Monitor menu » Controller » Currents » OverVoltageCutback. 6. See Programmer » System Monitor menu » Controller » Capacitor Voltage.	*Set:* The controller's capacitor bank voltage exceeded the OverVoltageCutback limit with the FET bridge enabled. *Clear:* Bring controller's capacitor voltage below the OverVoltageCutback limit.	Reduced brake torque. Note: This fault is declared only when the controller is running in regen.
2-5 0x25	**Ext 5V Supply Failure** *Ext_5V_Supply_Failure_Active* 0x2531 Fault Type(s): 1 = 5 V Supply's voltage is out-of-range 2 = 5 V Supply's current is out-of-range	1. External load impedance on the +5 V supply (pin 16) is too low. 2. See Programmer » System Monitor menu » Outputs: External_5V_Supply, Ext_5V_Current.	*Set:* (1) The 5 V Supply (pin 16) is outside 5 V±10 % (2) The current is outside limits defined by: *Ext_5V_Supply_Min* *Ext_5V_Supply_Max* *Clear: Reset Controller*, or Re-set using VCL variable Ext_5V_Output_Enable	Disables the 5 V Supply
2-6 0x26	**Ext 12V Supply Failure** *Ext_12V_Supply_Failure_Active* 0x2532 Fault Type(s): 1 = 12 V Supply's voltage is out-of-range 2 = 12 V Supply's current is out-of-range	1. External load impedance on the +12 V supply (pin 23) is too low. 2. See Programmer » System Monitor menu » Outputs: External_12V_Supply, Ext_12V_Current.	*Set:* (1) The 12 V supply (pin 23) is outside 12 V ± 15 % (2) The current is outside the limits defined by: *Ext_12V_Supply_Min* *Ext_12V_Supply_Max* *Clear: Reset Controller.* Or Re-set using VCL variable Ext_12V_Output_Enable.	Disables the 12 V Supply None, unless a fault action is programmed in VCL.
2-8 0x28	**Motor Temp Hot Cutback** *Motor_Temp_Hot_Cutback_ Active* 0x2151 Fault Type(s): 1	1. Motor temperature is at or above the programmed Temperature Hot setting—resulting in a reduction of controller drive current. 2. The motor temperature and sensor control parameters are misadjusted. 3. See Programmer » AC Motor Setup » Temperature Sensor.	*Set:* Motor temperature is at or above the Temperature Hot parameter setting. *Clear:* Bring the motor temperature within range.	Reduced Drive Torque If MotorBrakingThermal CutBack_Enable = On, then Regen Braking Torque is reduced.
2-9 0x29	**Motor Temp Sensor** *Motor_Temp_Sensor_Active* 0x2150 Fault Type(s): 1	1. Motor thermistor is not connected properly. 2. sensor polarity (between Pin 9 and Pin 12) is incorrect. 3. The motor temperature and sensor parameters are misadjusted. 4. See Programmer » System Monitor menu » AC Motor » Temperature.	*Set:* Motor thermistor input (pin 9) is at the voltage rail. *Clear:* Bring the motor thermistor input voltage within range.	MaxSpeed reduced (LOS, Limited Operating Strategy), and motor temperature cutback disabled.

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
3-1 0x31	**MAIN DRIVER** *Main_Driver_Fault_Active* 0x2222 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Open Wire (at pin)	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring.	*Set:* Main Contactor driver is either open or shorted. This fault can be set only when Main Enable = On. *Clear:* Restore/repair any external wiring or device-coil to their correct state, then *Reset Controller*.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
3-2 0x32	**EM Brake Driver** *EM_Brake_Driver_fault_Active* 0x2320 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Open Wire (at pin)	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring.	*Set:* Electromagnetic brake driver (pin 4) is either open or shorted. This fault can be set only when EM Brake Type >0. *Clear:* Restore/repair any external wiring or device-coil to their correct state, then *Reset Controller.*	ShutdownEMBrake ShutdownThrottle FullBrake
3-5 0x35	**Proportional Driver** *Proportional_Driver_Fault_ Active* 0x2440	See Driver 1 Fault (page 143)		
3-6 0x36	**Encoder Fault** *Encoder_Fault_Active* 0x2230 Fault Type(s): 1 = Loss of regulation 2 = Over Current trips Loss of pulses 3 = Loss of speed signal pulses 4 = Autocharacterization 5 = Encoder supply (voltage) fault	1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Programmer » System Monitor menu » AC Motor: Motor RPM. 4. See Programmer » AC Motor Setup » Quadrature Encoder » Encoder fault Setup.	*Set:* Motor encoder phase failure detected. *Clear:* Either *Reset Controller*, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder Fault is cleared and Encoder LOS fault (flash code 9-3) is set, allowing limited motor control.	ShutdownEMBrake ShutdownThrottle ShutdownMotor
3-7 0x37	**Motor Open** *Motor_Open_Active* 0x2240 Fault Type(s): 1	1. Motor phase is open. 2. Bad crimps or faulty wiring.	*Set:* Motor phase U, V, or W detected open. *Clear:* Cycle KSI.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
3-8 0x38	**Main Contactor Welded** *Main_Contactor_Welded_Active* 0x2220 Fault Type(s): 1	1. Main contactor tips are welded closed. 2. Motor phase U or V is disconnected or open. 3. An alternate voltage path (such as an external circuit to B+) is providing a current to the capacitor bank (B+ connection terminal).	*Set:* Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded (via the motor) for a short time and the voltage did not discharge indicating a direct-contact to the battery (i.e., Main tips are welded closed). *Clear: Reset Controller*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS

3-9 0x39	**Main Contactor Did Not Close** *Main_Contactor_Did_Not_Close_Active* 0x2221 Fault Type(s): 1 = Main did not close when commanded 2 = Main disconnected during operation	Type1: 1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact. 3. An external load on the capacitor bank (B+ connection terminal) is preventing the capacitor bank from charging. 4. Blown B+ fuse. 5. Main Contactor parameters mistuned
		    Main Pull In Voltage,
		    Main Holding Voltage.
		
		Type2: 1. Main opened during operation (while commanded closed). 2. Driver wiring to contactor's coil (e.g., pin 3 wiring) removed during operation. 3. Contactor/coil defective.
			Set: With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. *Clear: Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*

4-2 0x42	**Throttle Input** *Throttle_Input_Active* 0x2210 Fault Type(s): 4 1 = Outside the Low or High parameter.	1. Throttle voltage exceeded the Analog Low or Analog High parameters for the analog input defined for the throttle input. 2. See Programmer » Controller Setup » Analog Inputs » Analog 1 Type. 3. See Programmer » Controller Setup » Analog Inputs » Configure.	*Set:* Throttle voltage exceeded the *Analog Low* or *Analog High* parameters for the analog input defined for the throttle input. *Clear:* Bring throttle input voltage within the Min and max thresholds. *Reset Controller.*	ShutdownThrottle
4-6 0x46	**NV Memory Failure** *NV_Memory_Failure_Active* 0x2830 Fault Type(s): 1 = Invalid checksum. 2 = NV write failed. 3 = NV read failed. 4 = NV write did not complete during power down.	1. Failure to read or write to nonvolatile (NV) memory. 2. Internal controller fault.	*Set:* Controller operating system tried to read or write to EEPROM memory and failed. *Clear:* Download the correct software and matching parameter default settings into the controller and *Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1 ShutdownDriver2 ShutdownDriver3 ShutdownDriver4 ShutdownDriver5 ShutdownPD FullBrake*
4-7 0x47	**HPD Sequencing** *Hpd_Sequencing_Active* 0x2211 Fault Type(s): 1	1. Incorrect sequence in application of Keyswitch, Interlock, Direction, or Throttle. 2. Faulty wiring, crimps, or switches at KSI, Interlock, Direction, or Throttle. 3. Moisture in above-noted digital input switches causing invalid (real) On/Off state. 4. Verify input switch status. See Programmer » System Monitor menu » Inputs » Switch Status. 5. Verify Throttle. See Programmer » System Monitor menu » Inputs » Throttle Command.	*Set:* HPD (High Pedal Disable) or SRO (Static Return to Off) sequencing fault caused by incorrect sequence of KSI, interlock, direction, and throttle inputs. *Clear:* Reapply inputs in correct sequence.	ShutdownThrottle

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
4-7 0x47	**EMER Rev HPD** *Emer_Rev_Hpd_Active* 0x2331 Fault Type(s): 1	1. Emergency Reverse operation has concluded, but the throttle, forward and reverse inputs, and interlock have not been returned to neutral.	*Set:* At the conclusion of Emergency Reverse, the fault was set because various inputs were not returned to neutral. *Clear:* If EMR_Interlock = On, clear the interlock, throttle, and direction inputs. If EMR_Interlock = Off, clear the throttle and direction inputs.	ShutdownThrottle ShutdownEMBrake
4-9 0x49	**Parameter Change** *Parameter_Change_Active* 0x2813 Fault Type(s): Reports the CAN Object ID of parameter.	1. When Interlock is On, changing a safety-based parameter. Parameters with this property are marked with a [PCF] (Parameter Change fault) in the Parameter menu listings.	*Set:* Adjustment of a parameter setting that requires cycling of KSI. *Clear: Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
4-10 0x4A	**EMR Switch Redundancy** *Emr_Switch_Redundancy_Active* 0x2817 Fault Type(s): 1	1. Either or both Emergency Reverse input switches are inoperative, resulting in an invalid state. NO NC State On Off valid Off On valid On On invalid Off Off invalid 2. Ingress of dirt or moisture in switch(s).	*Set:* Emer Rev Switch NO input does not agree with the Emer Rev Switch NC input. *Clear:* Correct switch states. *Reset Controller.*	ShutdownInterlock ShutdownEMBrake
5-1 0x51	**User 1 Fault** *User_{1, 2 … 32}_Fault_Active* 0x2710 Fault Type(s): OEM Definable	1. These faults (and fault actions) can be defined by the User/OEM and are implemented in the application-specific VCL software. 2. See User/OEM documentation.	*Set:* See User/OEM documentation *Clear:* See User/OEM Documentation	See User/OEM Documentation
5-2 0x52	**User 2 Fault** 0x2711	See User 1 fault (above)	*Set:* See User/OEM documentation *Clear:* See User/OEM Documentation	See User/OEM Documentation
5-3 0x53	**USER 3 FAULT** 0x2712			
5-4 0x54	**USER 4 FAULT** 0x2713			
5-5 0x55	**USER 5 FAULT** 0x2720			
5-6 0x56	**USER 6 FAULT** 0x2721			
5-7 0x57	**USER 7 FAULT** 0x2722			
5-8 0x58	**USER 8 FAULT** 0x2723			
5-9 0x59	**USER 9 FAULT** 0x2730			
6-1 0x61	**USER 10 FAULT** 0x2731			
6-2 0x62	**USER 11 FAULT** 0x2732			

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
6-3 0x63	**USER 12 FAULT** 0x2733	See User 1 fault (above)	*Set:* See User/OEM documentation *Clear:* See User/OEM Documentation	See User/OEM Documentation
6-4 0x64	**USER 13 FAULT** 0x2740			
6-5 0x65	**USER 14 FAULT** 0x2741			
6-6 0x66	**USER 15 FAULT** 0x2742			
6-7 0x67	**USER 16 FAULT** 0x2743			
5-10 0x5A	**USER 17 FAULT** 0x2750			
5-11 0x5B	**USER 18 FAULT** 0x2751			
5-12 0x5C	**USER 19 FAULT** 0x2752			
5-13 0x5D	**USER 20 FAULT** 0x2753			
5-14 0x5E	**USER 21 FAULT** 0x2760			
5-15 0x5F	**USER 22 FAULT** 0x2761			
6-10 0x6A	**USER 23 FAULT** 0x2762			
6-11 0x6B	**USER 24 FAULT** 0x2763			
6-12 0x6C	**USER 25 FAULT** 0x2770			
6-13 0x6D	**USER 26 FAULT** 0x2771			
6-14 0x6E	**USER 27 FAULT** 0x2772			
6-15 0x6F	**USER 28 FAULT** 0x2773			
7-10 0x7A	**USER 29 FAULT** 0x2780			
7-11 0x7B	**USER 30 FAULT** 0x2781			
7-12 0x7C	**USER 31 FAULT** 0x2782			
7-13 0x7D	**USER 32 FAULT** 0x2783			

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
6-8 0x68	**VCL Run Time Error** *VCL_Run_Time_Error_Active* 0x2820 Fault Type(s): 1	1. Runtime errors are defined using the VCL Error Module and VCL Error. See the System Information file: • Curtis Software Suite™ » VCL Studio » Help 2. Using driver control commands in VCL can lead to VCL runtime errors if the VCL command and the driver assignment do not match.	*Set:* VCL Run Time Error detected *Clear:* Edit VCL application software to fix this error condition; flash the new compiled software and matching parameter settings; *Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1 ShutdownDriver2 ShutdownDriver3 ShutdownDriver4 ShutdownDriver5 ShutdownPD FullBrake*
7-2 0x72	**PDO Timeout** *PDO_Timeout_Active* 0x2541 Fault Type(s): 1	1. The time between CAN PDO messages received exceeded the PDO Timeout Period as defined by the Event Timer parameter. 2. Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.	*Set:* Time between CAN PDO messages received exceeded the PDO Timeout Period. *Clear:* Receive CAN NMT message, or *Reset Controller.*	ShutdownThrottle
7-3 0x73	**Stall Detected** *Stall_Detected_Active* 0x2231 Fault Type(s): 1	1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Programmer »System Monitor menu » AC Motor » Motor RPM.	*Set:* No motor encoder movement detected. *Clear:* Either *Reset Controller,* or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Stall Detected fault is cleared and the Encoder LOS fault (flash code 9-3) is set, allowing limited motor control.	ShutdownEMBrake ShutdownThrottle ShutdownMotor Control Mode changed to LOS (Limited Operating Strategy).
7-7 0x77	**Supervision** *Supervision_Active* 0x2840 Fault Type(s): Curtis Supervision Code	1. Internal controller fault.	*Set:* Internal controller failure *Clear:* Reset Controller.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1 ShutdownDriver2 ShutdownDriver3 ShutdownDriver4 ShutdownDriver5 ShutdownPD FullBrake*
7-9 0x79	**Supervision Input Check** *Supervision_Input_Check Active* 0x2841 Fault Type(s): 1	1. Internal controller fault.	*Set:* Damaged Controller. *Clear: Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1 ShutdownDriver2 ShutdownDriver3 ShutdownDriver4 ShutdownDriver5 ShutdownPD FullBrake*
8-2 0x82	**PDO Mapping Error** *PDO_Mapping_Error_Active* 0x2542 Fault Type(s): 1	1. The PDO Map has too many data bytes assigned or has objects mapped that are not compatible. 2. Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.	*Set:* Incorrect PDO map detected. *Clear: Reset Controller.*	PDO message disabled

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
8-3 0x83	**Internal Hardware** *Internal_Hardware_Active* 0x2835 Fault Type(s): Curtis hardware code	1. Internal controller fault detected.	*Set:* Internal controller fault detected. *Clear: Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
8-7 0x87	**Motor Characterization Error** *Motor_Characterization_Active* 0x2850 Fault Type(s): 71 Failure to write NV ram 72 Temp sensor fault 73 Motor hot 74 Controller temperature cutback 76 Undervoltage cutback 77 Overvoltage cutback 78 No encoder information 79 Current Regulator Tuning out of range 80 Current Regulator Tuning out of range 81 Encoder signal seen but step size not auto-detected 82 Aborted autocharacterization — 90/98 PMAC Sin/Cos no rotation detected 91 PMAC motor not rotating 92 PMAC Motor not accelerating. Low acceleration 94–97 PMAC lag compensation out of range 99 PMAC Motor rotating at start of characterization 102 PMAC motor temp sensor 103 PMAC motor temp hot cutback 104 PMAC controller temp cutback 106 PMAC Undervoltage cutback 107 PMAC overvoltage cutback	1. Motor characterization failed during characterization process. See fault type for cause.	*Set:* Motor characterization failed during the motor characterization process. *Clear: Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
8-8 0x88	**Encoder Pulse Error** *Encoder_Pulse_Error_Active* 0x2234 Fault Type(s): 1	1. Encoder Steps parameter does not match the actual motor encoder. 2. Verify parameter settings: AC Motor Setup » Quadrature Encoder » Encoder Steps.	*Set:* Detected wrong setting of the Encoder Steps parameter. *Clear:* Ensure the Encoder Steps parameter matches the actual encoder; *Reset Controller.*	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
8-9 0x89	**Parameter Out of Range** *Parameter_Out_Of_Range_Active* 0x2811 Fault Type(s): Reports the CAN Object ID of parameter.	1. Parameter value detected outside of the limits. 2. Use CSS to view and write parameter value and range.	*Set:* Parameter detected outside of limits *Clear:* Bring parameter within its limits.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*
9-2 0x92	**EM Brake Failed To Set** *EM_Brake_Failed_to_Set_Active* 0x2321 Fault Type(s): 1	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating.	*Set:* After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed. *Clear:* 1. Activate the Throttle (EM Brake type 2). 2. Activate the Interlock (EM Brake type 1).	ShutdownEMBrake ShutdownThrottle Position Hold is engaged when Interlock = On.
9-3 0x93	**Encoder LOS** *Encoder_LOS_Active* 0x2233 Fault Type(s): 1	1. Limited Operating Strategy (LOS) control mode has been activated; as a result of either an Encoder Fault (flash code 3-6) or a Stall Detected fault (flash code 7-3). 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Vehicle is stalled.	*Set:* Encoder Fault (flash code 3-6) or Stall Detected (flash code 7-3) was activated, if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder LOS (flash code 9-3) control mode is activated, allowing limited motor control. *Clear:* Cycle KSI or, if LOS Mode was activated by the Stall Detected fault, clear by ensuring encoder senses proper operation, Motor RPM = 0, and Throttle Command = 0.	LOS Mode
9-4 0x94	**Emer Rev Timeout** *Emer_Rev_Timeout_Active* 0x2330 Fault Type(s): 1	1. Emergency Reverse was activated and concluded because the EMR Timeout timer has expired. 2. The emergency reverse input is stuck On.	*Set:* Emergency Reverse was activated and ran until the EMR Timeout timer expired. *Clear:* Turn the emergency reverse input (switch) to Off.	ShutdownThrottle ShutdownEMBrake
9-9 0x99	**Parameter Mismatch** *Parameter_Mismatch_Active* 0x2812 Fault Type(s): 1 = Dual Drive is enabled in Torque Mode. 2 = Motor Tech = SPMSM, Feedback = Encoder 3 = Motor Tech = ACIM, Feedback = Sin/Cos	1. Incorrect position feedback type chosen for motor technology in use. 2. Dual drive is enabled in torque mode. 3. Dual drive enabled on only one controller.	*Set:* 1. When the Dual Drive software is enabled, the controller must be set to either Speed Mode Express or Speed Mode; otherwise this fault is set. 2. Motor Technology = 1 must be paired with Feedback Type = 2; otherwise this fault is set. 3. Motor Technology = 0 must be paired with Feedback Type = 1; otherwise this fault is set. *Clear:* Adjust parameters to appropriate values and then Reset Controller.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSE	SET / CLEAR CONDITIONS	FAULT ACTIONS
9-10 0x9A	**Interlock Braking Supervision** *Interlock_Braking_Supervision_ Active* 0x2332 Fault Type(s): 1 Motor speed is outside the Interlock Brake Supervision Speed Limit. 2 Interlock is Off and EM Brake not applied within time limit. 3 Interlock is Off and EM Brake not applied, and the rotor position is outside the RPM-position limit.	1. During an interlock braking event, the motor speed exceeded the limit set by the Interlock Braking Supervision parameters. 2. See Programmer » Application Setup » Interlock Braking » Supervision Enable. 3. See Programmer » Application Setup » Interlock Braking » Interlock Braking Supervision.	*Set:* During an interlock braking event, the motor speed exceeded the limit set by the Interlock Braking Supervision parameters. *Clear: Reset Controller.*	ShutdownMotor ShutdownEMBrake ShutdownMainContactor
9-11 0x9B	**EMR Supervision** *Emr_Supervision_Active* 0x2333 Fault Type(s): 1	1. During an EMR event, the motor speed exceeded the limit set by the Emergency Reverse Supervision parameters. 2. See Programmer » Application Setup » Emergency Reverse » Emergency Reverse Supervision.	*Set:* During an interlock braking event, the motor speed exceeded the limit set by the Emergency Reverse Supervision parameters. *Clear: Reset Controller.*	ShutdownMotor ShutdownEMBrake ShutdownMainContactor
10-1 0xA1	**Driver 1 Fault** *Driver_1_Fault_Active* 0x2160 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 1 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 1 » Driver 1 Overcurrent.	*Set:* Driver 1 is either open or shorted. Or Driver 1 exceeded its overcurrent setting. *Clear:* Correct open or short, and then *Reset Controller.*	ShutdownDriver1
10-2 0xA2	**Driver 2 Fault** *Driver_2_Fault_Active* 0x2161 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 2 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 2 » Driver 2 Overcurrent.	*Set:* Driver 2 is either open or shorted. Or Driver 2 exceeded its overcurrent setting. *Clear:* Correct open or short, and then *Reset Controller.*	ShutdownDriver2
10-3 0xA3	**Driver 3 Fault** *Driver_3_Fault_Active* 0x2162 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 3 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 3 » Driver 3 Overcurrent.	*Set:* Driver 3 is either open or shorted. Or Driver 3 exceeded its overcurrent setting. *Clear:* Correct open or short, and then *Reset Controller.*	ShutdownDriver3

Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
10-4 0xA4	**Driver 4 Fault** *Driver_4_Fault_Active* 0x2163 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 4 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 4 » Driver 4 Overcurrent.	*Set:* Driver 4 is either open or shorted. Or Driver 4 exceeded its overcurrent setting. *Clear:* Correct open or short, and then *Reset Controller.*	ShutdownDriver4
10-5 0xA5	**Driver 5 Fault** *Driver_5_Fault_Active* 0x2164 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 5 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 5 » Driver 5 Overcurrent.	*Set:* Driver 5 is either open or shorted. Or Driver 5 exceeded its overcurrent setting. *Clear:* Correct open or short, and then *Reset Controller.*	ShutdownDriver5
10-8 0xA8	**Driver Assignment** *Driver_Assignment_Active* 0x2632 Fault Type(s): 5 {X} = Driver number that cause the fault	1. A Driver Output is used for two or more functions. 2. See Programmer » Controller Setup » IO Assignments » Coil Drivers: Main Contactor Driver, EM Brake Driver, Hydraulic Contactor Driver.	*Set:* Driver assignment conflict *Clear:* Resolve the conflicted driver assignment, then *Reset Controller.*	ShutdownDriver{X} (Driver in non-operational)
11-1 0xB1	**ANALOG 1 OUT OF RANGE** *Analog_1_Out_Of_Range* 0x2620 Analog_X_Out_of_Range Fault Type(s): 1 = above High limit 2 = below Low limit	1. Analog 1 input voltage above the parameter setting of Analog 1 High. 2. Analog 1 input voltage is below the parameter setting of Analog 1 Low. 3. See Programmer » Controller Setup » Analog Inputs » Analog 1. 4. See Programmer » Controller Setup » Analog Inputs » Configure » Analog 1 Low/Analog 1 High.	*Set:* (1) Input voltage (on pin) is above the parameter's set-point threshold. (2) Input voltage (on pin) is below the parameter's set-point threshold. *Clear:* Return the voltage to within the allowed range, then *Reset Controller.*	None, unless a fault action is programmed in VCL.
11-2 0xB2	**ANALOG 2 OUT OF RANGE** *Analog_2_Out_Of_Range* 0x2621	See Analog 1 Out of Range.	See Analog 1 Out of Range	None, unless a fault action is programmed in VCL.
11-3 0xB3	**ANALOG 3 OUT OF RANGE** *Analog_3_Out_Of_Range* 0x2622	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.
11-4 0xB4	**ANALOG 4 OUT OF RANGE** *Analog_4_Out_Of_Range* 0x2623	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.
B-5 0xB5	**ANALOG 5 OUT OF RANGE** *Analog_5_Out_Of_Range* 0x2624	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.

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Table 16 AC F2-A Controller Troubleshooting Chart, cont'd

FLASH CODE	FAULT NAME (Curtis Software Suite™)	POSSIBLE CAUSES	SET/CLEAR CONDITIONS	FAULT ACTIONS
11-6 0xB6	ANALOG 6 OUT OF RANGE *Analog_6_Out_Of_Range* 0x2625	See Analog 1 Out of Range.	See Analog 1 Out of Range	None, unless a fault action is programmed in VCL.
11-7 0xB7	ANALOG 7 OUT OF RANGE *Analog_7_Out_Of_Range* 0x2626	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.
11-8 0xB8	ANALOG 8 OUT OF RANGE *Analog_8_Out_Of_Range* 0x2627	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.
11-11 0xBB	ANALOG 14 OUT OF RANGE *Analog_14_Out_Of_Range* 0x262A	See Analog 1 Out of Range.	See Analog 1 Out of Range.	None, unless a fault action is programmed in VCL.
11-12 0xBC	Analog Assignment *Analog_Assignmnt_Active* 0x2631 Fault Type(s): 9 {X = 1–8, 14} X = Analog Input number that caused the fault	1. An Analog Input is used for two or more functions. 2. An Analog Input is outside the range of analog inputs. 3. See Programmer » Controller Setup » IO Assignments » Controls.	*Set:* An Analog Input is used for two or more functions or is outside the range of analog inputs *Clear:* Resolve assignment conflict, and then *Reset Controller.*	None, unless a fault action is programmed in VCL.
12-1 0xC1	Branding Error *Branding_Error_Active* 0x2860 Fault Type(s): 1	1. Software and hardware branding mismatch. 2. For technical support on this fault, contact the Curtis distributor where you obtained your controller or the Curtis sales-support office in your region.	*Set:* Software/Hardware incompatibly. *Clear:* As applicable: Load Branded software, or use Branded controller with the correct device profile and the correct Curtis Software Suite toolkit key.	*ShutdownMotor ShutdownMainContactor ShutdownEMBrake ShutdownThrottle FullBrake*