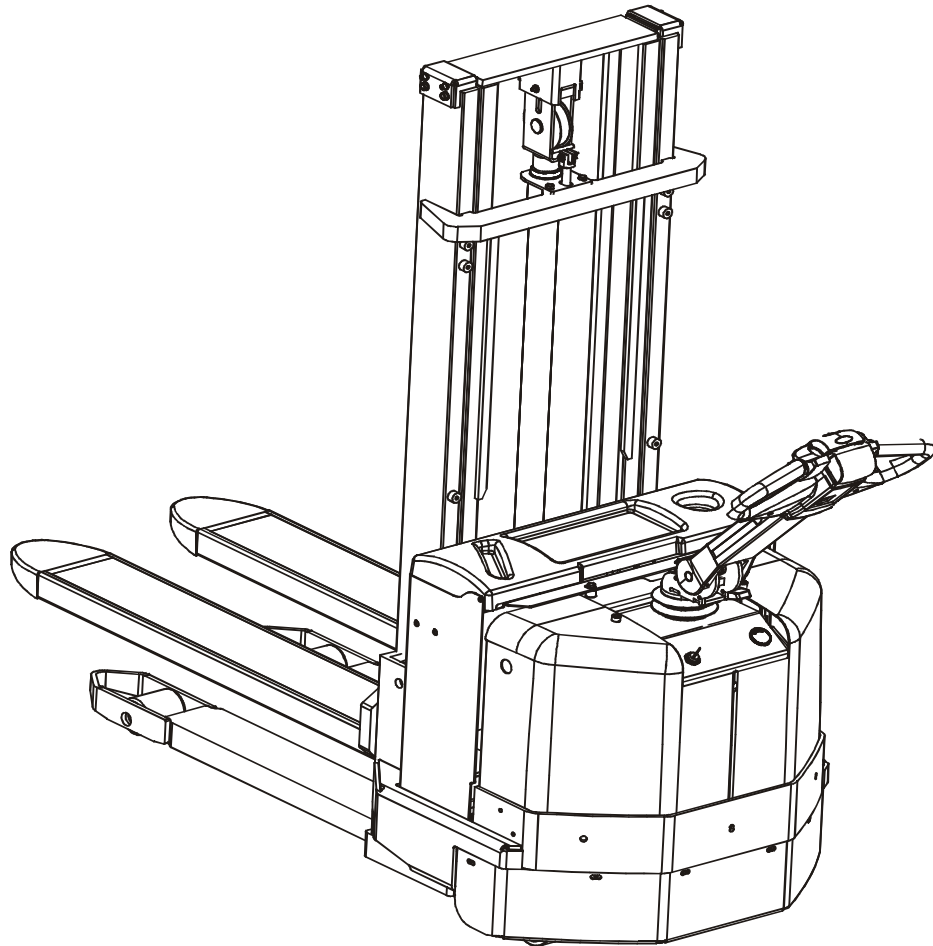


Service Manual

en



7SM10, 7SM12, 7SM12S

Valid from serial number: 715612-

Order number: 226306-040

Issued: 2006-03-13 ITS

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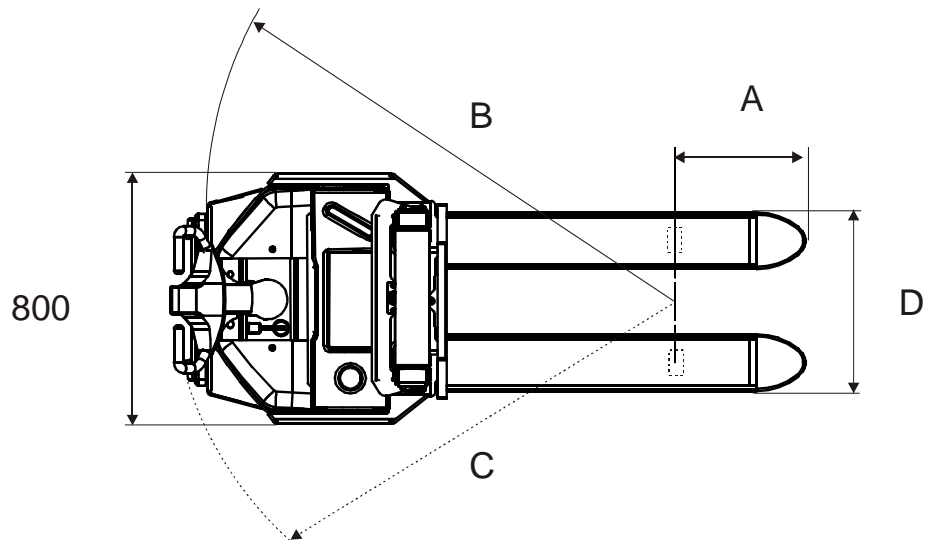
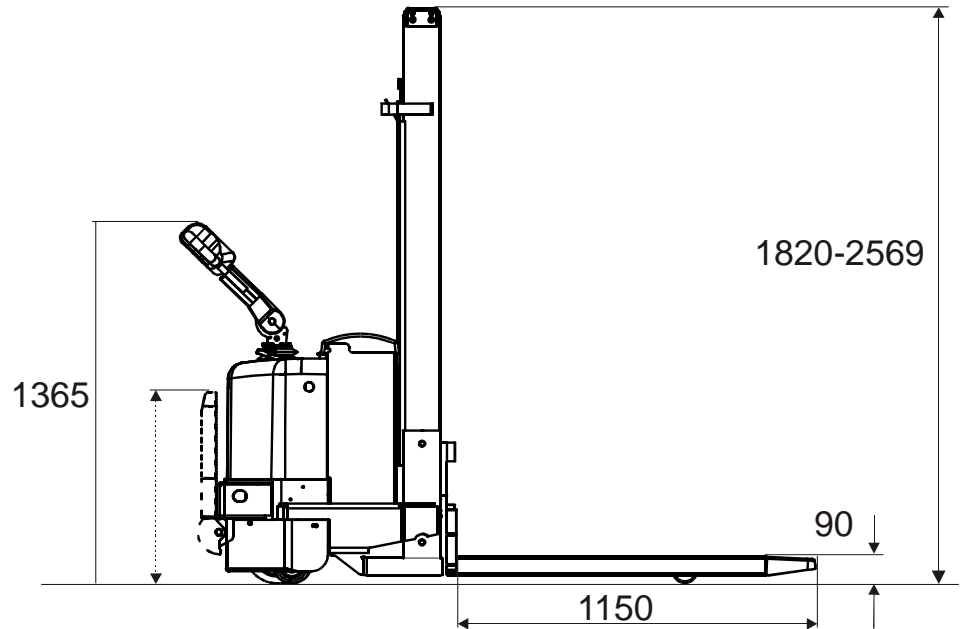
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2.4 Truck dimensions

The illustration shows external dimensions for the truck in its standard design.



	7SM10	7SM12
A	414	384
B	1482	1479
C	1574	1571
D	570-685	520-685

Technical data – M4

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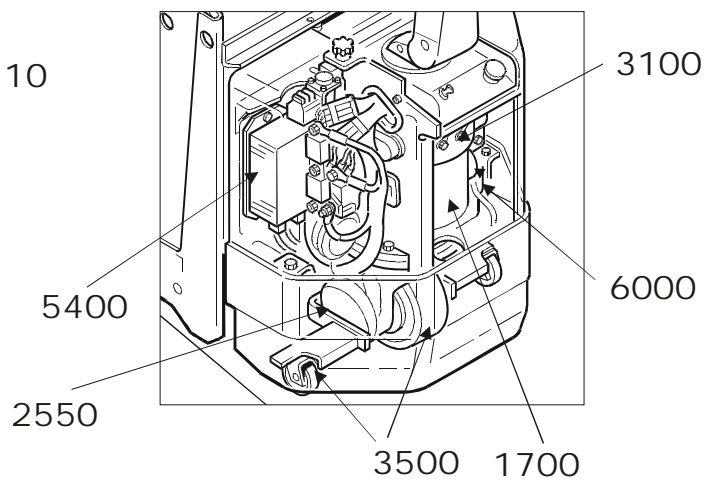
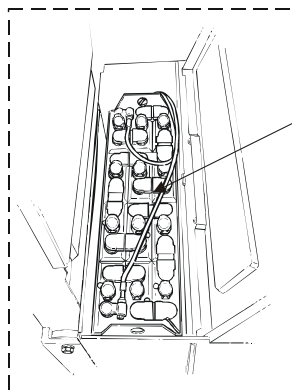
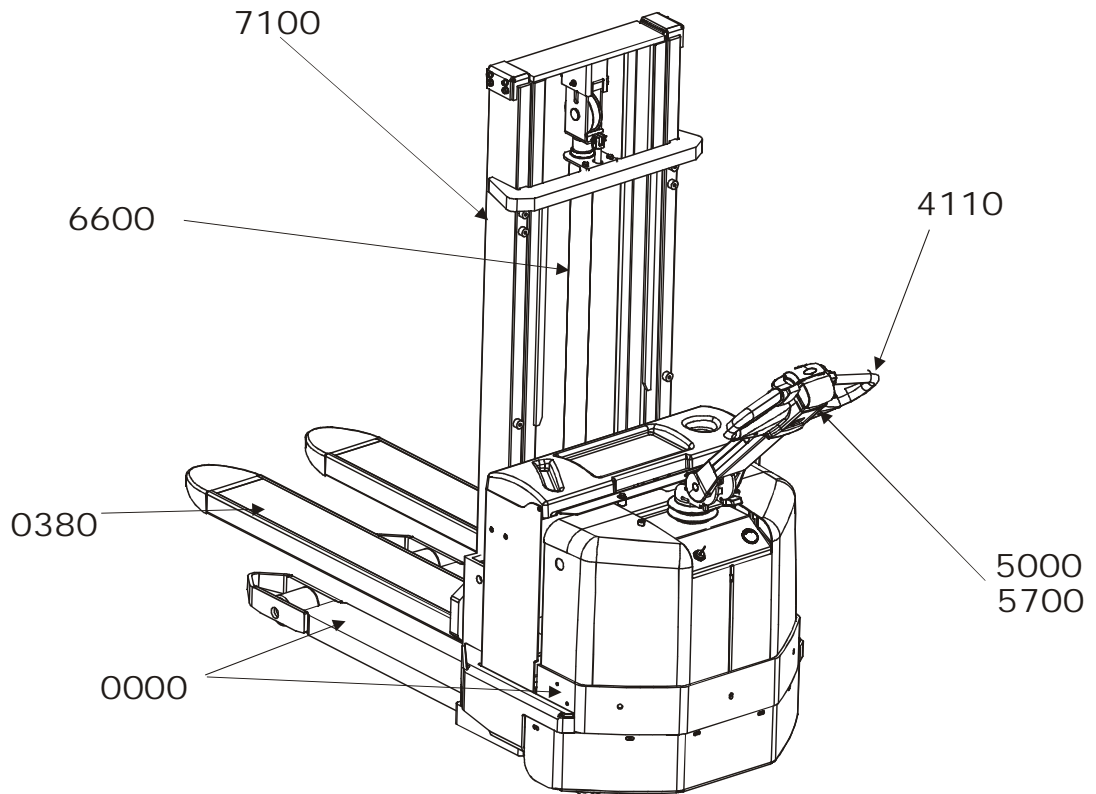
Model	7SM10	7SM12	7SM12S
Driving speed			
Without load, 0-750 kg, km/h	6.0	6.0	6.0
With rated load, km/h	5.3	5.3	5.3
Lift/lowering speed			
Lift without load, m/s	0.19	0.19	0.19
Lift with rated load, m/s	0.10	0.10	0.10
Lowering without load, m/s	0.15	0.15	0.15
Lowering with rated load, m/s	0.19	0,19	0,19
Power consumption			
Driving without load, A	23	23	23
Driving with rated load, A	30	34	34
Lift without load, A	TBA	54	54
Lift with rated load, A	TBA	148	148
Incline climbing ability			
With rated load	8 %	10 %	8 %
Measurement, L2			
Medium	741	728	805
Long		780	857
Turning radius WA	1482	1479	1519
Weight			
Truck without battery, Medium	570	727	765

TBA=To Be Announced

Preventive maintenance – P2

Maintenance schedule

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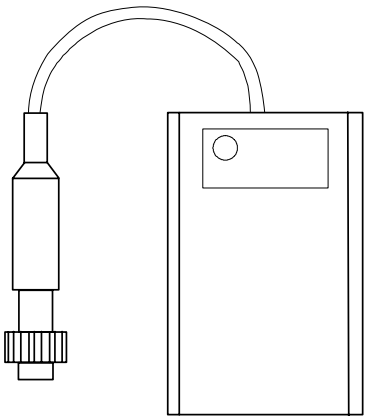
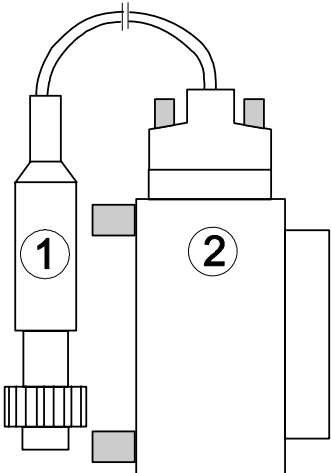
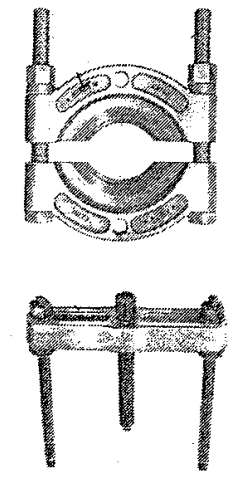
Order number
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2006-03-13

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7.5 Other tools

Figure	Number	Application
	179915	Service instrument (CAN)
	1=163793 2=163792	Service instrument for programme changes
	08-13022	Driving gear puller

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9.3 Technical data

Type of machine	7SM10, 7SM12, 7SM12S
Type	TSL140S-DS30
Output (kW)	1,2
Intermittence	S2 60 min.
Minimum length of carbon brush (mm)	13
Minimum commutator diameter (mm)	47
Resistance, shunt field winding Ω at 25 C°	0,55
Resistance, armature winding, Ω at 24C°	0,0156
Insulation resistance between windings and motor housing	$\geq 1\text{Mohm}$
Weight (kg)	14

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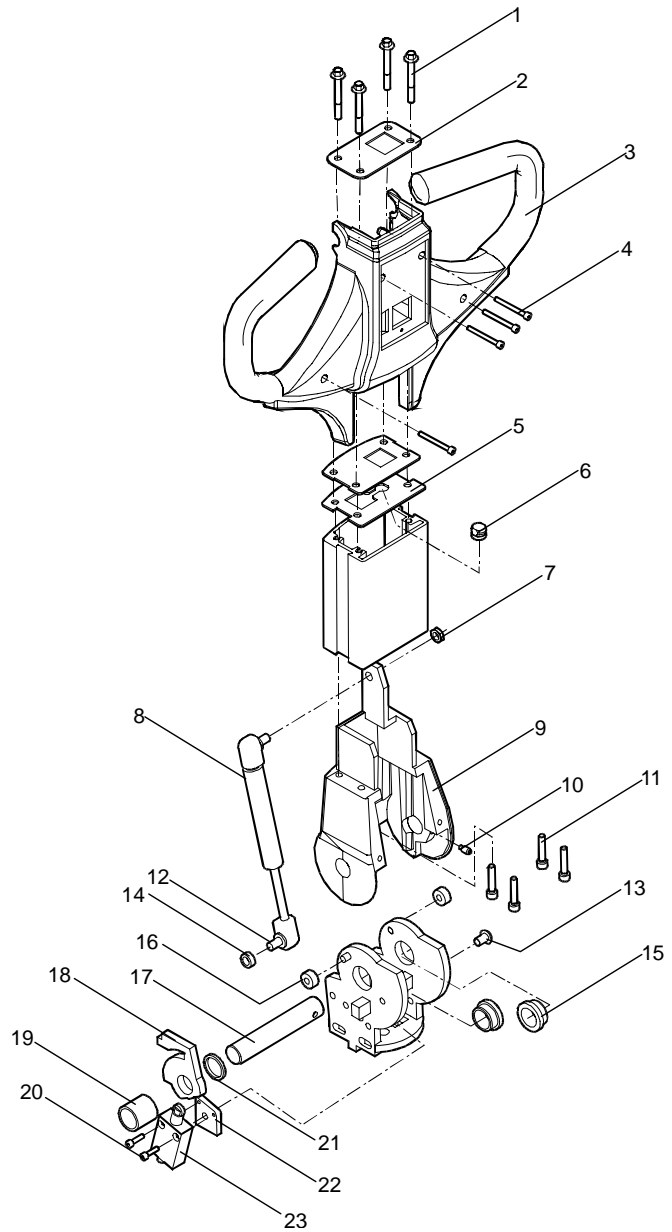
Date
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12-Steering – 4000

12.1 Component parts, tiller arm



Pos	Description	Note
1	Screw	4
2	Washer	
3	Handle	
4	Screw	4
5	Washer	2

Electrical systems

Electrical parts

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Symbol	Description	Function	Notes
Y41	Magnetic valve	Fork lowering	
X1	Connector	Battery	
X41	Connection point	CAN-communication	

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13.4.6 Lifting the forks

- A2:S19 activated.
- Battery status OK (if battery capacity >20% left).

13.4.7 Lowering the forks

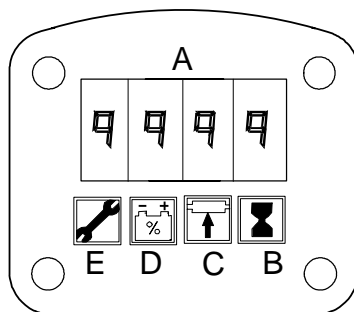
- A2:S20 activated.

13.4.8 Horn

- S18 activated.

13.4.9 Hour meter

- Press S18 and turn S17 to “on” at the same time.
- Press S18 until you read H= hour meters.
- You have now chosen H=hourmeters the symbol “B” will be high-lighted.
- You can now choose type of hourmeter by pressing the speed control.



A= Key time.

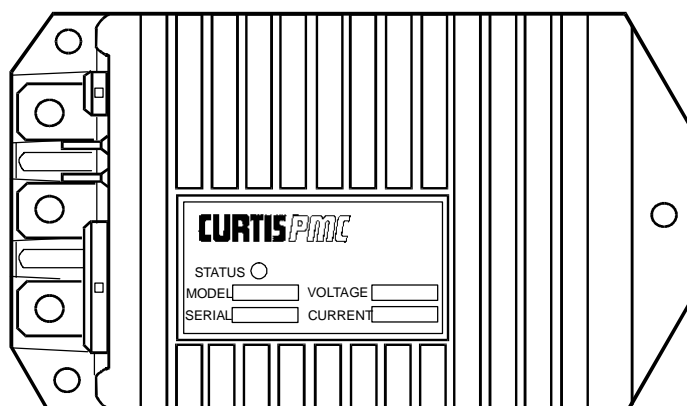
b= Drive motor time.

c= Pump motor time.

d= Activity time.

s= Time to service.

13.4.10 Transistor regulator



Curtis 1243 is a regulator [A1] for controlling separately excited motors (SEM). Varying the voltage applied through the armature primarily controls the speed. The voltage is varied through use of pulse-width modu-

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13.5.3 Ustawianie parametrów operatora - bez CAN klucza serwisowego

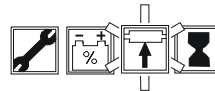
WAZNE!

Operatorskie parametry mogą zostać zmienione bez klucza jeśli parametr #39 ma ustawioną wartość 1, 3, 5, 7, 9 or 11. (Patrz strona 38)

Aby zmienić wartość podstawowych parametrów operatora wzoruj się poniższym schematem postępowania:

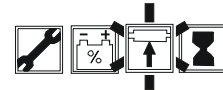
- Włącz wózek (standardowo lub przy pomocy PIN-code). Jest to ważne w przypadku kiedy wózek ma ustawioną więcej niż jedną wartość parametru operatorskiego (1-9). Jakkolwiek zmiana może być widoczna tylko wtedy gdy wcisniemy odpowiedni Pin-code danego operatora.
- Wybierz odpowiedni parametr.
- Wcisnij klakson S18.

Symbol parametrów miga.



- Ustaw wartość parametru przez wielokrotne użycie manetki L1 do góry lub w dół.
- Wcisnij klakson S18 raz aby zatwierdzić ustawioną wartość.

Sybol parametrów świeci (nie miga).



- Wylącz wózek wciskając przycisk  znajdujący się na klawiaturze.

W tym momencie skończyłeś zmieniać wartości parametrów. Przy następnym włączeniu wózka ustawione parametry będą zapamiętane.

W celu znalezienia szczegółowych informacji na temat parametrów i ich wpływu na zachowanie wózka znajdź rozdział "Parameter description" na stronie 28.

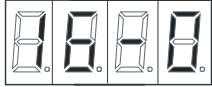
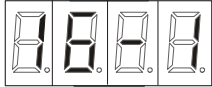
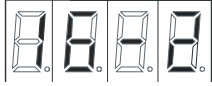
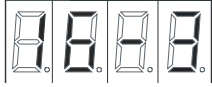
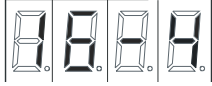
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Instructions for verifying parameter setting

- Charge up the battery
- Use the truck in its normal application until the battery indicator shows an empty battery (0% on the display).
- Remove the battery from the truck and allow to rest for at least two hours. NB! No charging or discharging during this period.
- Measure the acid weight of the battery at room temperature. If the acid weight is less than 1.15 g/cm^3 , **the parameter value must** be reduced. If the value significantly exceeds 1.15 g/cm^3 , the risk of damage to the battery is reduced. At the same time, the operating time of the truck is reduced. If a longer operating time is required, the parameter value can be increased. Maximum one unit.
- Each change must be accompanied by a new verification of the parameter setting.

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Table 11: Base option 2 - Reduced drive speed by SEU i/p

Argument #0	Option designator		
Initial display  (value shown after 2 s delay)	Values	Meaning	
	2	Sets relevant option parameter to handle base option 2	
Argument #1	Selection of SEU unit 1 or 2		
Initial display  (value shown after 2 s delay)	Values	Meaning	
	0	option is handled by SEU unit 1(A36)	
	1	option is handled by SEU unit 2 (second SEU unit)	
Argument #2	Selection of SEU digital input		
Initial display  (value shown after 2 s delay)	Values	Meaning	Pin no.
	0	activate SEU digital i/p 1 (1mA)	5
	1	activate SEU digital i/p 2 (1mA)	19
	2	activate SEU digital i/p 3 (1mA)	33
	3	activate SEU digital i/p 4 (1mA)	6
	4	activate SEU digital i/p 5 (7mA)	20
	5	activate SEU digital i/p 6 (7mA)	34
	6	activate SEU digital i/p 7 (7mA)	7
	7	activate SEU digital i/p 8 (7mA)	21
Argument #3	Speed limitation as a percentage of max. speed		
Initial display  (value shown after 2 s delay)	Values	Meaning	
	0-12	Max. speed adjustable from 40-100% formula: $=40+5*Arg.3$ e.g. $40+5*4=60\%$	
Argument #4	Speed range		
Initial display  (value shown after 2 s delay)	Values	Meaning	
	0	Affects only high speed range	
	1	Affects only low speed range	
	2	Affects both speed ranges	

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13.6 Diagnostic and troubleshooting

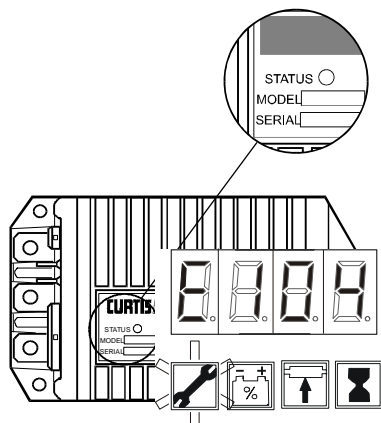


Fig. 7

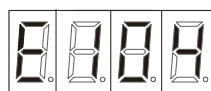
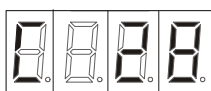
means constantly on
 means flashing

13.6.1 General

The truck's electronic control system incorporates built-in fault code display and logging. This capability works as a powerful complement in assessing the cause of eventual truck malfunctions. When a fault code occurs the code number is displayed and the fault condition LED flashes (Fig. 7).

The codes can be broadly divided into two groups:

- Caution codes - denoted by prefix "C". These codes alert the operator to the presence of a caution condition. Caution codes in the range C50 to C99 will limit the truck's maximum speed to creep-speed. The conditions which cause such codes can usually be easily remedied without further attention. Caution codes C19 to C43 are not stored in the code history log.
- Error codes - denoted by prefix "E". These codes alert the operator to the presence of a fault condition in the truck. Error codes E100 and higher will stop all truck driving functions until the error code is cleared.



The first time any fault code is displayed it is advisable to check if the condition persists by switching the truck off completely. i.e. disconnect the battery and then switch back on. Check to see if the fault code is again displayed.

13.6.2 Error code history

Up to 50 of the most recently occurred fault codes will be stored in a log along with the hour meter reading when the fault occurred. When the fault code log is displayed, it shows the fault codes in chronological order with the newest code first.

Carry out the following to display the fault code log:

- Ensure the battery is connected.
- Ensure the truck is switched off. Press on the keypad.
- Press and hold horn button S18 for at least 1 second, enter a valid PIN-code and then press on the keypad.
- Hold S18 depressed until "E" is displayed (Fig. 8), then release S18.

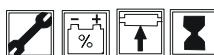
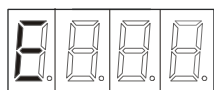
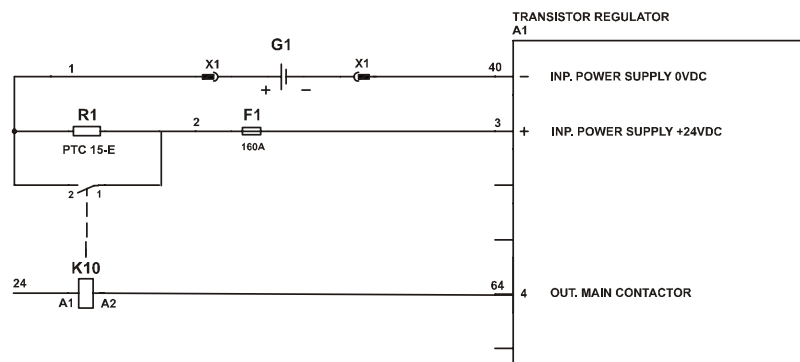


Fig. 8

Fault symbol lights.

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Code	E108
Description	Contacteur K10 does not open.
Possible error cause	Main contactor points welded. Short circuit in the travel regulator's output A1/4.
Action	<ol style="list-style-type: none"> 1. Check that the contactor's contact points are not welded together. 2. Check that the R1 resistor is not short-circuited. 3. If the contact points are OK, but the contactor engaged, check cable 64 and the travel regulator's output A1/4.



Code	E110
Description	System error.
Possible error cause	Temporary error/error in the travel regulator.
Action	<ol style="list-style-type: none"> 1. Restart the machine. 2. Replace travel regulator.

Code	E140
Description	Error in control total.
Possible error cause	Fault on the internal micro-monitoring (tiller arm head), incorrect software or circuit board.

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13.7 Technical specifications – Curtis 1243

	Value	Unit	Explanation
Rated operating voltage	24	Volts	
Overvoltage limit	33	Volts	
Undervoltage limit	16	Volts	Minimum operating voltage
Electrical insulation towards cold body	500	V AC	Minimum
PWM frequency	16	kHz	
Max. current of armature winding *	150	Amps	for 2 minutes
	100	Amps	for 1 hour
Max. current of field winding	20	Amps	for 2 minutes
	20		for 1 hour
Contactor voltage	24	Volts	Same as battery voltage
Contactor current	2	Amps	Max (current limit at 2.5 amps)
KSI input voltage, Min.	16.8	Volts	
KSI input current	50	mA	
Logic input voltage	>7.5; High <1; Low	Volts	
Logic input current	15	mA	
Operating temperature	-40 to +50	°C	
Overtemperature, reduction	85	°C	
Undertemperature, reduction	-25	°C	

* During specific test conditions.

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15.4 Lubrication

Mineral and synthetic oils can be used to relubricate Rexnord chains.

NOTE!

Lubricant must not contain substances such as molybdenum disulphide, PTFE or the like.

A lift chain should be offloaded from the weight of the fork carriage (hanging free) when lubricated.

• Lubrication intervals:

- 500 hours with normal operations
- 100 hours when driving in rugged environments such as cold stores and corrosive environments.

The chains are sprayed with lubricant. Note the entire chain must be lubricated, even the fastening bolts. It is especially important that the part of the chain which runs over the chain sprocket is well lubricated.

The lubricate must comply with the viscosity demands at respective temperatures as set out in the table below. The following lubricants are recommended:

Ambient temperature	Viscosity class	Recommended Products*
> - 40°C < - 30°C	VG 15	Klüberoil 4UH 1-15, Klüber Lubrication
> - 30°C < + 5°C	VG 68	Klüberoil 4UH 1-68N, Klüber Lubrication Anticorit LBO 160 TT, Fuchs DEA
> + 5°C < + 45°C	VG 150	Klüberoil 4UH 1-150N, Klüber Lubrication Anticorit LBO 160, Fuchs DEA Rexoil, Rexnord Kette
>+ 45°C <+ 80°C	VG 220	Klüberoil 4UH 1-220N, Klüber Lubrication

* Equivalent products from another manufacturer may be used.

NOTE!

Do not use a special rust protective agent to prevent rust on the lift chains.

These agents impair the lubrication of the chains. Regular lubrication is the best method to prevent rust attack.










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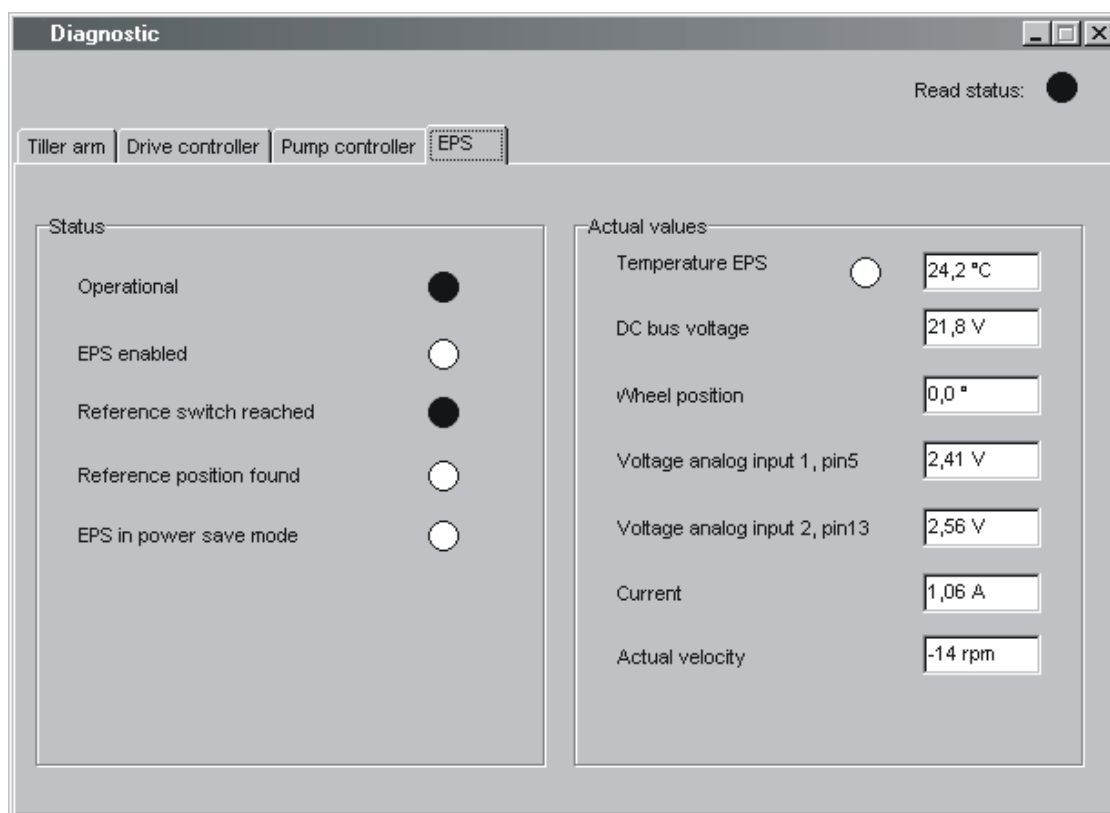
T-code
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17.3.3 Icons

Icon	Description
	Node OK is shown when contact is made with a node and no errors have been reported.
	Node not connected is shown when there is no contact with a node in the network.
	Node not OK is shown when an error has been reported by a node. Click on node to obtain more information.
	Program version is shown when information is available on which software is installed. Click to obtain more information.
	Information is shown when a node has information on, for example, error codes.
	Truck report GB“17.7 Truck report function” on page 8
	Parameters is shown when a node has information on a parameter.
	Diagnostics
	Exit

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17.9.5 “EPS” steering servo tab



Clicking on the “EPS” tab will display a dialogue showing the following:

“Status”

- “Operational” - Indicates the status of the servo’s control system
- “EPS enabled” - Indicates the status of the servo’s power stage output.
- “Reference switch reached” - indicates status of drive wheel in centre reference switch.
- “Reference position found” - indicates whether a successful steering in centre has been performed.
- “EPS in power save mode” - Shows whether the steering servo is in the standby mode (following a certain amount of inactivity).

“Actual values” (Measured values)

- “Temperature EPS” - The temperature of the steering servo output stage in degrees Celsius.
- “DC bus voltage” - Supply voltage to steering servo
- “Wheel position” - Shows the estimated steering angle of the drive wheel.
- “Voltage analog input 1, pin5” - The measured DC input signal (0) from the steering potentiometer.
- “Voltage analog input 2, pin13” - The measured DC input signal (1) from the steering potentiometer.

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