EPAC
Throttle Pedal / Speed Limiter
878000

JRsystems

Throttle pedal, function

The pulsewidth modulated output current (PWM-signal) is proportional to the pedal position.
The system functions as a speedlimiter by using a PNP-sensor or a magnetic pickup to measure the vehicles groundspeed.
The speed limit is completely adjustable.
An extra input offers automatic dethrottling while shifting.
The system can handle two pedals, e.g. if the vehicle is fitted with a rotating seat.

Parameters, general

The parameters are used to adjust the systems sensitivity and function. The access code have to be entered before programming of parameter(s) 0 - 9 is possible. The acces code does not have to be reprogrammed as long as the unit is switched on.
All the parameters can be adjusted from 00 to 99.
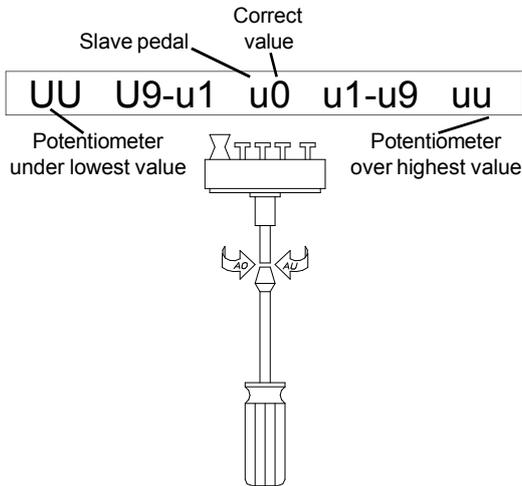Please read the manual before trying to program the unit.

A1, adjusting the potentiometer

Slave pedal

Correct value

UU   U9-u1   u0   u1-u9   uu

Potentiometer under lowest value

Potentiometer over highest value

A1, mechanical calibration

The pedal has to be adjusted properly in order to obtain high precicion from the potentiometer. Normally this is done in the factory. The potentiometer is adjusted in parameter A1 and the value should be as close to 0 as possible.
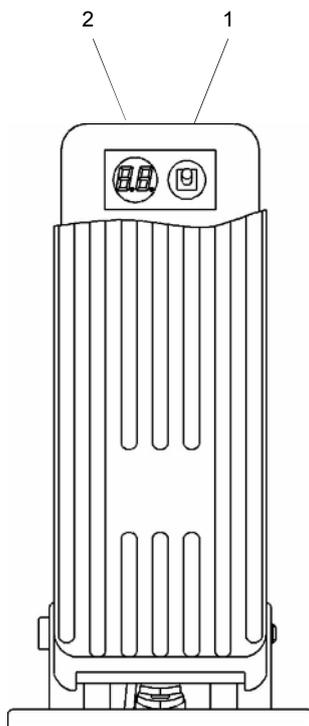1.   Press switch #1 once to go to parameter A1.
The left digit corresponds to the slave pedal and the right digit to the main pedal. If no slave pedal is used the left digit will always read U. Remember that this is a mechanical adjustment and the unit only displays the value of the potentiometer.

Access codes
I I I I   Code 1 = 00
I I I   Code 2 = 00
I I   Code 3 = 00
I   Code 4 = 35

Programming

Programming is done with the programming switch #1 and the pedal. Use the switch to change parameter number and the pedal to change the parameter value.

1.   Press switch twice to go to access code 1. Enter correct value.

2.   Press switch once to go to access code 2. Enter correct value. Continue in the same manner for access code 3 and 4.

3.   Press switch once to go to parameter -0. Enter requested value. Use switch to step between parameter numbers and pedal to change parameter value.

Once the desired parameter have been changed, locate the parameter (--), wait a second.... and the values are saved and programming terminated.
If you do not want to save changed parameter values, locate parameter (-), wait a second.... and programming is terminated without saving changes.

Parameter description

(- 0) Start- and (- 1) end current.
The start current (-0) is necessary amount of current needed to move the directional valve's spool to the activation point. The start current is adjustable between 130 mA and 0.8/1.6* A.

The end current (-1) is necessary amount of current needed to obtain maximum desired flow in the directional valve. The value is adjustable between 130 mA and 0.8/1.6* A . The end current can never be programmed to a lower value then the start current.
*Depending on hardware and software.

Parameter description, continued

(- 2) Vehicle groundspeed range
The groundspeed range is the vehicle top speed, translated into Hz.
An example;
The vehicle is equipped with a PNP-sensor to monitor the groundspeed. The sensor is attached by the transmission output shaft and has 2 sensor lugs. The ratio between the transmission output shaft and the wheels are 1:20. The diameter of the wheels are 75 cm. The vehicles max groundspeed is 30 km/h.

ratio 1:20

Max.
Groundspeed
30km/h

diameter 75cm

PNP-sensor
2 sensor lugs
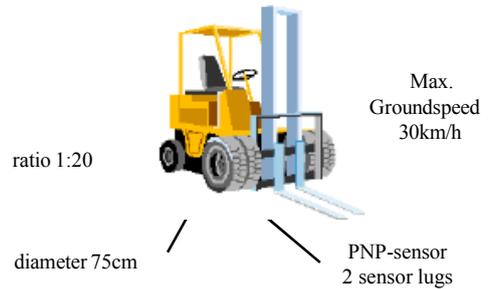
We start by converting the top groundspeed into meters per second by using the following formula:

$$\frac{30km/h}{3.6} = 8.3m/s$$

Then we calculate the number of pulses per meter by multiplying the number of sensor lugs with the transmission ratio and dividing the result with the diameter of the wheels (diameter x pi).

$$\frac{2 \times 20}{0.75m \times 3.14} = 17ppm$$

We can now calculate the reduction range in hertz by multiplying the top groundspeed in m/s with the number of pulses per meter.

8.3m/s x 17ppm = 141 Hz, rounded off to 200 Hz

Each parameter step equals 100 Hz, eg. value 2 = 200 Hz.
Due to filtration of incomming pulses, the parameter values 0 - 9 are used for PNP-sensors, (min 10pulses/ wheel rev) and 10 - 50 for magnetic pickups.. . All values over 50 equals 5000 Hz.

0Hz	47Hz	94Hz	141Hz	200Hz
0km/h	10km/h	20km/h	30km/h	(44km/h)

VEHICLE SPEED

(- 3) Vehicle max groundspeed-speed limit
This is where you set the maximum permitted groundspeed level. The value is a percentage parameter (-2).
Example 1; you want the speed limitation at 20 km/h and the top groundspeed is 30 km/h - the parameter value will be 47 (47%).

example 1
$$\frac{20km/h}{30km/h} \; X \; 141 = 94Hz \qquad \frac{94}{200} = 47\%$$

(- 4) Reduction sensitivity
This is where you set the sensitivity for the speed limitation.
Value 00 represents the lowest, and 99 the highest sensitivity. The parameter is used to "fine tune" the speed limit function.
Please note the diagram to the right:
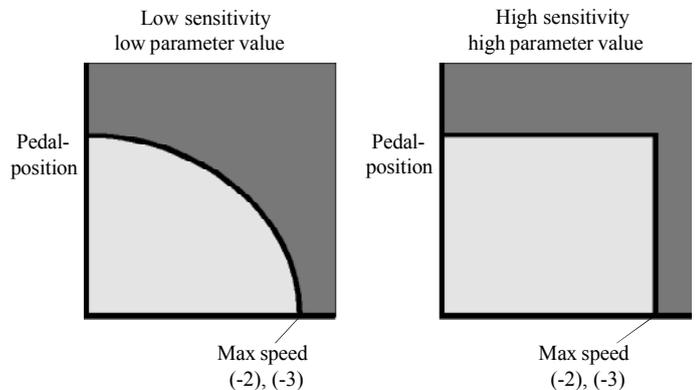
(AS) Electrical calibration of the pedal position
This parameter automatically calibrates the unit with the pedal potentiometer.
1.   Locate the parameter (AS), the display shows 00.
2.   Depress the slave pedal* fully (left digit on the display changes).
3.   Depress the main pedal fully (right digit on the display changes).
4.   Let go of the pedal and wait... The unit saves the potentiometer values and terminates programming.
*If no slave pedal is used the left digit will remain the same.

Low sensitivity
low parameter value

Pedal-position

Max speed
(-2), (-3)

High sensitivity
high parameter value

Pedal-position

Max speed
(-2), (-3)

Parameter list

A1   Mechanical calibraiton of the pedal potentiometer.

IIII   Access code 1 = 00
III   Access code 2 = 00
II   Access code 3 = 00
I   Access code 4 = 35

-0   Start current
-1   End current
-2   Vehicle groundspeed range
-3   Vehicle max groundspeed-speed limit
-4   Reduction sensitivity
AS   Electrical calibration of the pedal pot.

- -   Exit <u>and save</u> programming mode
-   Exit <u>without saving</u> programming

Technical specifications

Supply	12 VDC (10 - 18 VDC)
	24 VDC (20 - 30 VDC)
Max. Ouput	1.6 A / PWM output
	1.6 A dethrottle-output
PWM frequency	125 Hz
Working temp.	- 40° C - +70° C
Pedal deadband	2°
Total pedal stroke	19°
Pedal angle	30°, 35°, 45°
Groundspeed sensor	PNP / magnetic pickup
	Min 10p/wheel rev
In- and outputs	Shortcircuit protected
EMC- protected	

Colour codes, wiring

Red	Supply +12/24 VDC
Blue	Ground
White	Output PWM-signal
Black	Return PWM-signal
Brown	Pulses from PNP-sensor
Orange	Input for automatic dethrottling
Green	Input from 2:nd pedal

Error codes

E12, the unit has picked up potentiometer values outside the control pedals limit. The outputs are deactivated. This function is to prevent unintentional moving of the machine if the pedal fails (for example intermittent connections, or a worn out potentiometer).

Notes

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JRsystems, Rev 2010-03

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Important information about our control/ecu units

- Check that the contents of the package are according to order confirmation and that the items are in good condition. Put in claim for incorrectness to supplier as soon as possible.

- Ensure a stable voltage source for optimal function. This is true about electric forklift trucks in particular. Supply voltage is 12V or 24V and should be secured with a fuse.

- Wiring harness between the control/ecu unit and the actuator should not be drawn together with the vehicle's power cables or next to power connections on electric engines, radio transmitters, etc. Do not draw the control unit harness in a closed circle, or through circles of other cables.

- Disturbing effects from relays and other inductive loads used in the vehicle should be neutralised. NOTE: This is not valid for PWM-coils.

- Remove the vehicle voltage feed and ground connection from the vehicle if welding is necessary.

- Make sure that you protect the vehicle against static electricity whenever you work with it. Connect the chair armrest to the vehicle chassis in order to lead away static electricity caused by friction between the driver and the chair. Outgoing negative voltage from any DC/DC converter preferably be connected to the vehicle chassis.

- Do not open the control/ecu unit. Contact the service organisation if error occurs. If the control unit is opened or modifies the JRsystems AB guarantee will expire. If the control unit modifies without JRsystems AB permission we disclaim our responsibility for the product.

- Do not expose the control/ecu unit to impacts. If someone drop the control unit or similar it should be sent to supplier for control.

- Clean the control unit regularly with a damp rag with mild soap solution. The control unit cannot be soaked in water, washed with high-pressure wash or have any other direct contact with water.

- The control unit is to be placed on an armrest to give the best ergonomic benefits. Choose an armrest with switch in the joint of the chair. Supply voltage shall be disconnected when the armrest is raised.

- Turn off the control/ecu unit if error indication occurs and search for and correct the reason. If the problem is in the control unit it should be sent to supplier for repair. Do never use a vehicle with a control unit with error indication.

- Use shielded wires to sensors and connect the shield to the grounded box. Shielded wires should only have one ground connection point.

- Use sealed connectors and gold plated pins/sockets for analogue signals.

- Include the control unit in the daily inspection of the vehicle before every start-up. Check that the control unit is in good condition especially the bellow, the lever and the buttons. If possible check the harness and the connector. Contact the vehicle manufacturer for advice or service if you have any hesitations.

- Recommended wire areas: $1,5mm^2$ for supply voltage and ground. Other wires $0,6mm^2$. *For EMMI*: For use of 5A (Dig out 1 and Dig out 2) $1,5mm^2$ is recommended.

- *Only valid for EMMI:* To secure the specified EMC requirements even in extreme circumstances, we recommend a ferrite placed on the harness as closed to the control unit as possible. Requirements of the ferrite: Impedance 168 at 25Mh, 250 at 100 MHz, 300 at 300 MHz and 205 at 500Mhz. JRsystems AB part number 848782 or 848783.