Instruction

programming

EPAC Mini steering wheel 891000

JRsystems

Presentation

Mini steering wheel, function

The mini wheel features the same steering possibilities as the original steering wheel.

The mini wheel's output signal is a pulsewidth modulated signal (PWM-signal).

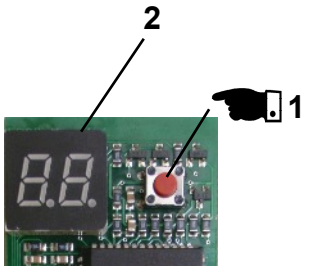
The steering system can be offered with a speed related function.
This function ensures maximum steering speed as long as the vehicle is standing still, and a proportional output reduction when the groundspeed Increases.
The function of the speedsensor is constantly monitored, and if a sensor failure occurs the system locks to existing reduction value and the system indicates the malfunction to the driver. To reset this function turn the system off.

Extra on/off-signals are available to for instance control a loading valve in a load sensing hydraulic system or for shifting vehicle direction (F-N-R).

Access code
Code 1=24* or 00**
Code 2=03* or 00**
Code 3=19* or 00**
Code 4=35* or 35**
---
*Software version 3.13 and older.
**Software version 3.14 and newer.

Parameters, general description

All the parameters can be adjusted from 00 to 99.
The four access codes have to be entered before programming of the parameter(s) -0 to -9 is possible.
The access codes are programmed in the same way as all other parameters, and does not have to be reprogrammed as long as the unit is switched on.
Please read the manual through before programming the unit.



Programming

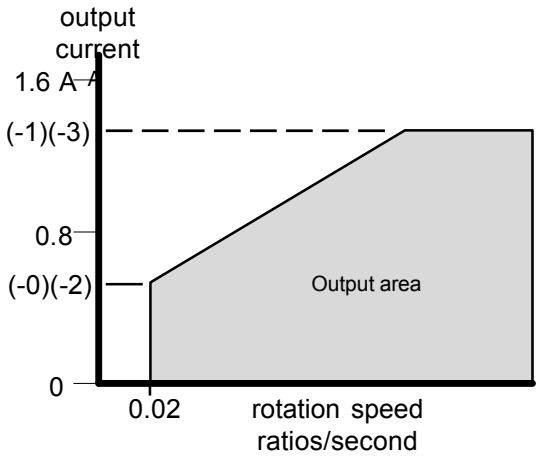
Programming is done with the programming switch #1 and the wheel.
Use the switch to change parameter number and the wheel to change the parameter value.

1. Press switch once 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 wheel 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) to (-3) Start- and end current
The start current 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. Parameter (-0) for right and (-2) for left .
The end current 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. Parameter (-1) for right and (-3) for left.The end current can never be programmed to a lower value then the start current.

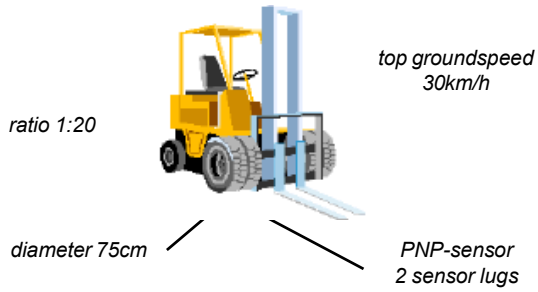
* Depending on hardware and software version.

Programming

Parameter description,continued

(-4) Up-ramp (damping)
To enjoy a smooth output signal you may have to use an up-ramp. The parameter adds a delay (up-ramp) to the output signal to ensure a soft steering.
The right display digit shows the right outputs ramp value and the left display digit shows the ramp value for the left output signal. The value is adjustable from 0 to 1 sek (value 1 = 0,125 sek, value 2 = 0,250 etc.). Please note that the reaction time of the miniwheel is increased when using up-ramp.

(-5) Vehicle groundspeed range
The reduction range can be described as the groundspeed range which the vehicle normally travels within, 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 top groundspeed is 30 km/h.



We start by converting the top groundspeed into meters per second by using the following formula:

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

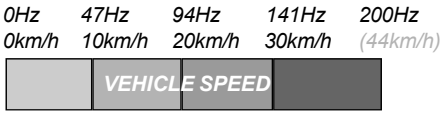
Then we calculate the number of pulses per meter by multiplying the number of sensor lugs with the transmission ratio and dividing the result with the diameter of the wheels.

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

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

$$8.3m/s \times 17ppm = 141Hz, \text{ rounded off to } 200Hz$$

Each parameter step equals 100 Hz, eg. value 5 = 500 Hz.
Due to filtration of incomming pulses, the parameter values 00 - 09 are used for PNP-sensors and 10 - 50 for magnetic pickups.



(-6) Vehicle groundspeed at start of reduction
The parameter value will set the groundspeed level where the speed reduction function* will start. The value is a percentage of parameter (-5). Example 1:
If you want the reduction to begin at 10 km/h and the top groundspeed is 30 km/h, the parameter value will be 24 (24%).

example 1

$$\frac{10km/h}{30km/h} \times 141 = 47Hz \qquad \frac{47}{200} = 24\%$$

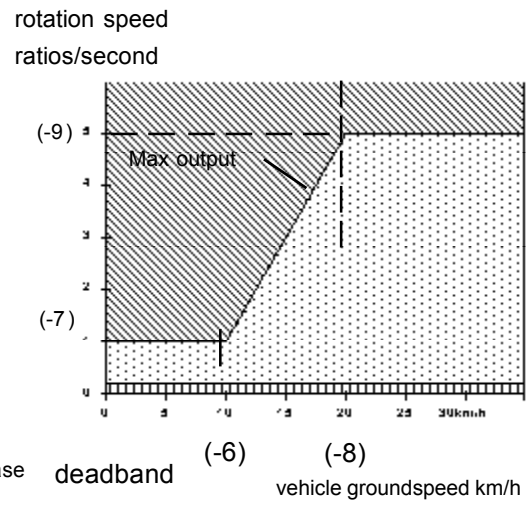
(-7) Mini wheel rotation speed
This specifies the number of ratios per second needed to obtain the maximum output before the reduction function is activated. Value 00 to 99 represents 1 to 5 ratios per second.

example 2

$$\frac{20km/h}{30km/h} \times 141 = 94Hz \qquad \frac{94}{200} = 47\%$$

(-8) Vehicle groundspeed at max reduction
The parameter value will set the groundspeed level where you will have maximum speed reduction* (see parameter -9).
The value is a percentage of parameter (-5). Example 2:
If you want the reduction to end at 20 km/h and the top groundspeed is 30 km/h, the parameter value will be 47 (47%)

(-9) Mini wheel rotation speed at max reduction
This specifies the number of ratios per second needed to obtain the maximum output after the reduction function's maximum value is reached (according to parameter 8). Value 00 to 99 represents 1 to 5 ratios per second.



---

* The speed reduction function changes proportionally the mini-wheel rotation speed, between the values of parameter (-7)and (-9), as the vehicle groundspeed changes between a speed corresponding to value of parameter (-6) and (-8). This enabling the sensitivity of the steering to decrease as the vehicle speed increase.

Technical specifications

Parameter list

I	Access code 1
II	Access code 2
III	Access code 3
IIII	Access code 4

-0	Start current, right output
-1	End current, right output
-2	Start current, left output
-3	End current, left output
-4	Up-ramp (damping)
-5	Groundspeed reduction range
-6	Vehicle groundspeed, reduction start
-7	Mini wheel rotation speed.
-8	Vehicle groundspeed, max reduction
-9	Mini wheel rotation speed, max reduction
--	Exit and save programming mode
-	Exit without saving programming mode

Technical specifications

Supply voltage	12 VDC (10 - 18 VDC) 24 VDC (20 - 30 VDC)
Max. output curent	1.6 A / output, PWM-signal 1.6 A extra output
PWM frequency	125 Hz
Max. up-ramp	1 sek
Working temp.	- 40° C - +70° C
Rotational deadband	<7°/second
Groundspeed sensor	PNP-sensor or magneticpickup Min 10 p/ wheel rev
In- and outputs EMC- protected	Short circuit protected

The extra signal is activated when the rotation speed exceeds 7°/ second

Colour codes, wiring

Red Supply	+12 / 24 V DC
Blue	Ground
White	PWM-signal, right
Grey	PWM-signal, left
Black	PWM-signal return, right/left
Brown	Pulses from groundspeed sensor
Green	Extra output
Blue / red	Supply forward/reverse switch
Yellow	Signal forward
Purple	Signal reverse

Error codes

E10, the unit has registered a sensor failure when the display shows E10. The speed reduction function is locked to existing value at the time of failure. If the pulses from the sensor returns the speed reduction will automatically go back to normal function, but the display will show E10 until the power has been turned off.

Notes

JRsystems, Rev 2010-03

Bäckv 18, 192 54 Sollentuna, SWEDEN Tel:+46-8-50907300 Fax: +46-8-50907309

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.