



www.zeeltronic.com
info@zeeltronic.com

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USER MANUAL

VCDI-21 DIGITAL IGNITION CONTROL UNIT

TECHNICAL DATA

Limit values:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	8 Volts
- maximum supply voltage	20 Volts
- max. supply voltage for 1 minute	40 Volts
- current draw	25 mAmp
- maximum continuous current for solenoid and shift light output	1 Amp
- peak current for solenoid and shift light output	5 Amp

Circuit is protected against reverse supply voltage (wrong connection).

Features:

- two channel isolated input
- three programmable ignition curves (TPS33%, TPS66%, TPS100%)
- store and load function for two ignition curve sets
- TPS function (ignition curve is 3D interpolated above TPS33%)
- programmable on/off output for solenoid (RPM and TPS dependent)
- programmable duty cycle output for solenoid (RPM and TPS dependent)
- shift light output
- shift kill
- external switch for changing ignition map while riding
- tachometer output
- easy and fast programming on the field, via hand held programmer
- programming while machine running - you can immediately see effects
- each curve can be set in 4 to 12 curve points
- three stage rev limit (retard timing, reduced spark, spark off)
- signal delay compensation
- instant monitoring of rev's, angle and TPS position, via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1us
- timing calculation for every 1 RPM change (1000, 1002, .. , 9805, 9806, ...)

1. HOW TO ENTER MENU

VCDI must be connected to power supply. Connect **programmer** to **VCDI** and wait few seconds for activation of **programmer** and then press . With pressing or you can move through menu and with pressing you can choose. You can exit menu with choosing **Exit**.

2. MENU ORGANISATION

Load Settings	- load previously saved ignition curve set (from #1 to #2)
Save Settings	- save new ignition curve set (from #1 to #2)
Ignition Curve	- ignition curve parameters
Solenoid 1	- output for solenoid 1 (on/off)
Solenoid 2	- output for solenoid 2 (duty cycle)
Gear Shift Light	- shift light
Shift Kill Time	- shift kill time
Rev Limit	- rev limit
Static Angle	- static angle (stator position)
Compensation	- signal delay compensation (from pickup to spark plug)
Pulse Width	- output signal pulse width
TPS close [0%]	- calibrating TPS close position
TPS open [100%]	- calibrating TPS open position
Remote SW	- activating/deactivating external switch
Exit	

3. LOAD SETTINGS

Enter menu and move to **Load Settings** with pressing or and then press . Now you can select position number of previously saved ignition curve set, with pressing or and then press .

4. SAVE SETTINGS

Enter menu and move to **Save Settings** with pressing or and then press . Now you can select position number to which you want to save your ignition curve set, with pressing or and then press .

5. Set IGNITION CURVE

Three ignition curves must be programmed for different TPS positions. **VCDI** does not only switch between ignition curves, but also calculate timing between programmed curves for all TPS positions above 33%. From idle to 33% is used only one ignition curve.

Enter menu and move to **Ignition Curve** with pressing or and then press .
Now you are in submenu for selecting ignition curve.

Submenu organisation:

Nr. of Points	- number of ignition curve points (from 4 to 12)
Curve 0-33%	- ignition curve from 0 to 33% TPS
Curve 66%	- ignition curve for 66% TPS
Curve 100%	- ignition curve for 100% TPS
Exit Curve	- exit submenu

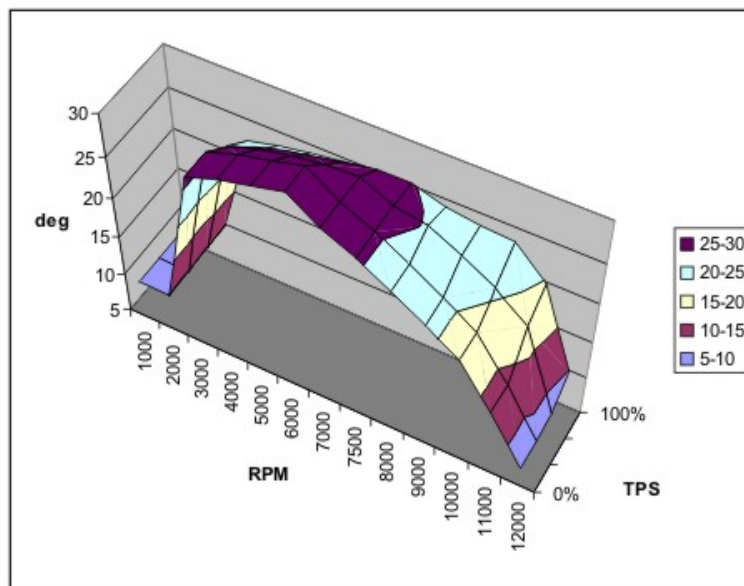
Important!

To avoid wrong processing, don't make unreasonable curve course.

Every time you make any changes to ignition curve, it is automatically saved to #0 position.

Then you can save it to any other position number from #1 to #2.

Curve Example:



5.1. Set NUMBER OF IGNITION CURVE POINTS

Move to **Nr. of Points** with pressing or and then press .

Now you can select number of ignition points, with pressing or and then press .

5.2. Set PARAMETERS OF IGNITION CURVE POINT

Move to point you want to change, with pressing or and then press .

Now you can change rev point with pressing or (in 100 rpm steps) and then press .

Now you can change advance angle with pressing or (in 0.1deg steps) and then press .

6. Set SOLENOID 1 parameters

Enter menu and move to **Solenoid 1** with pressing or and then press .

Now you are in submenu for selecting **Solenoid 1** parameters.

Submenu organisation:

Solenoid 1 ON RPM	- revs for activating output 1
Solenoid 1 OFF RPM	- revs for deactivating output 1
Solenoid 1 ON TPS	- throttle position for activating output 1
Exit	- exit submenu

Example:

Solenoid 1 ON (RPM) = 1000rpm

Solenoid 1 OFF (RPM) = 3000rpm

Solenoid 1 ON (TPS) = 35%TPS

Output 1 is switched on, when revs are above 1000rpm and throttle position above 35%TPS.

Output 1 is switched off, when revs are above 3000rpm or throttle position is below 35%TPS.

6.1. Set SOLENOID 1 ON RPM

Enter menu and move to **Solenoid 1 ON RPM** with pressing or and then press .

Now you can change rev limit with pressing or (in 100 rpm steps) and then press .

6.2. Set SOLENOID 1 OFF RPM

Enter menu and move to **Solenoid 1 OFF RPM** with pressing or and then press .

Now you can change rev limit with pressing or (in 100 rpm steps) and then press .

6.3. Set SOLENOID 1 ON TPS

Enter menu and move to **Solenoid 1 ON TPS** with pressing or and then press .

Now you can change TPS position with pressing or (in 1%TPS steps) and then press .

7. Set SOLENOID 2 parameters

Three duty cycle curves for different throttle positions can be programmed. Each curve can be programmed in eight rev points.

Enter menu and move to *Solenoid 2* with pressing or and then press .

Now you are in submenu for selecting *Solenoid 2* parameters.

Submenu organisation:

Curve 0-33%	- duty cycle curve from 0 to 33% TPS
Curve 34-66%	- duty cycle curve from 34 to 66% TPS
Curve 67-100%	- duty cycle curve from 67 to 100% TPS
Exit	- exit submenu

7.1. Set PARAMETERS OF SOLENOID 2 CURVE POINT

Move to point you want to change, with pressing or and then press .

Now you can change rev point with pressing or (in 100 rpm steps) and then press .

Now you can change duty cycle with pressing or (in 1% steps) and then press .

8. Set GEAR SHIFT LIGHT

Enter menu and move to *Gear Shift Light* with pressing or and then press .

Now you can change rev point with pressing or (in 100 rpm steps) and then press .

9. Set SHIFT KILL TIME

Enter menu and move to *Shift Kill Time* with pressing or and then press .

Now you can change kill time with pressing or (in 10 ms steps) and then press .

10. Set REV LIMIT

Enter menu and move to *Rev Limit* with pressing or and then press .

Now you can change rev limit with pressing or (in 100 rpm steps) and then press .

11. Set STATIC ANGLE

Enter menu and move to *Static Angle* with pressing or and then press .

Now you can set static angle with pressing or (in 0.1deg steps) and then press .

More information's about static angle you can find in section 17.

12. Set COMPENSATION

It is compensation of signal delay from pickup to spark plugs. You can check this delay with stroboscope lamp. Without this compensation, ignition advance angle decreasing with rising revs.

This compensation helps that advance angles in ignition curve are real (more accurate).

How to check, if compensation is correct:

First you must set flat ignition curve. Then measure with stroboscope lamp, if mark at flywheel moving when changing revs. If mark moving then you must change compensation delay.

Change Compensation:

Enter menu and move to **Compensation** with pressing or and then press .

Now you can change compensation delay with pressing or and then press .

13. Set PULSE WIDTH

It is output pulse width (duration) in us. It affect on CDI triggering. Recommended setting is 200us or 100us.

Enter menu and move to **Pulse Width** with pressing or and then press .

Now you can change pulse width with pressing or (in 100us steps) and then press .

14. Set TPS close [0%]

For correct operation, TPS close position must be calibrated!

Enter menu and move to **TPS close [0%]** with pressing or and then press .

Leave throttle at close position and confirm calibrating with pressing , or exit calibration with pressing . Displayed number should be between 0 and 500.

15. Set TPS open [100%]

For correct operation, TPS open position must be calibrated!

Enter menu and move to **TPS open [100%]** with pressing or and then press .

Move throttle to maximum open position and confirm calibrating with pressing , or exit calibration with pressing . Displayed number should be between 500 and 1010.

16. Set REMOTE SW

Enabling or disabling external switch for changing ignition curves while riding.

Enter menu and move to **Remote SW** with pressing or and then press .

Now you can enable or disable external switch with pressing or and then press .

17. MECHANICAL SETTINGS (Static Angle)

Static Angle is ignition advance angle, set with stator (generator).

Measure this angle with dial gauge. This measured **Static Angle** is your maximum advance angle you can set with **VCDI**.

Example:

*Measured **Static Angle** = 39.2deg (this angle you must enter in VCDI)*

Calculating mm to deg or vice versa:

α = ignition advance in degrees

T = ignition advance in mm

R = engine stroke divided by 2 in mm

L = conrod length in mm

$P = R + L - T$

$$\alpha = \cos^{-1} \left(\frac{P^2 + R^2 - L^2}{2 \cdot P \cdot R} \right)$$

$$T = L + R \cdot (1 - \cos \alpha) - \sqrt{L^2 - (R \cdot \sin \alpha)^2}$$

18. MONITORING

Connect **programmer** to **VCDI** and wait few seconds for activation of **programmer**. First information displayed on the **programmer** is software version.

With **programmer** you can watch revs, calculated advance ignition angle and TPS position.

Information!

You can connect or disconnect **VCDI** unit from **programmer** any time you want, without any harm. It is not important, if motor running or not and if power supply is connected or not.

Important!

Do not use too much force when connecting or disconnecting **programmer** unit!

19. ERROR REPORTS

Two errors can be displayed:

Program Memory Error - when program memory is corrupted. With this error present, function of program could be faulty.

EEPROM Error - when eeprom memory is corrupted. All programmable data are stored in eeprom memory (curve, rev limit...). With this error present, function of program could be faulty. *You must check all your settings and correct changed.*