



# DVC Family Program Variables Quick Reference Guide

*The information in this publication is intended as a guide only, and HCT take NO responsibility for usage and implementation in any user written application code structure.*

*HCT strongly suggests that the user attends one of the product training courses to ensure correct and full understanding of this information and to learn further optimized methods of control techniques.*

*Please contact HCT customer service to book one of the scheduled training dates or to discuss arranging a course specific to your company needs.*

*Thank you for using High Country Tek Inc. Products.*



**Welcome** to the High Country Tek Inc. DVC Program Variable Quick Reference Guide, and thank you for selecting the HCT range of controllers to use in your application.

The following information is designed to allow you to find the correct variable with correct syntax and use it effectively within your application code.

Some of these variables are commonly known while others were available but not obvious to the user until now, and our field application engineers ( FAE's ) have also guided engineering to add and clarify variables that were unavailable before.

We value our customers, their experience and abilities and ask that if you would like to see any additions, subtractions or find any errors in this publication, that you contact HCT's customer service so that we can correct the information and make sure that our programming community is using the latest information.

## **Program Variables:**

Program variables are identifiers that are used by you in your application program to refer to specific input or output values and to control the operation of a specific Input or Output.

This information is divided into various subsections according to Input / Output category and the following gives the definition of all the available program variables for the DVC family of products.

We will be adding real programming examples and proven algorithms to this manual as the HCT applications library grows, please do not hesitate to send us your programming tips, shortcuts or code that you feel would benefit other users of our controllers and equipment.

### **An example would be how to have a joystick control a bi-directional coil –**

**'enable the output  
PWM\_1.ENABLE = TRUE**

**'Set the direction of a twin coil (bi-directional valve)  
PWM\_1.DIR=ANA\_1.DIR**

**'Set the % of input = to the % of current (within Min and Max limits)  
PWM\_1=ANA\_1**

### **Or how to utilize a function curve –**

**curve1.in=ana\_1  
pwm\_1=curve1.out**

If you require urgent support, more information or would like specific programming areas clarified, please contact us on the customer support number at 1 530 265 3236 or mail us through our website at [www.highcountrytek.com](http://www.highcountrytek.com), giving details of your issue and how we can contact you.



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## Digital Input:

Name	Description	Range
<b>Name1</b>	Set/Get the state of the switch	False or Off, True or On
<b>Name.RealRPM</b>	For Pulse inputs Only. This will display the REAL calculated RPM.	0 to 9999
<b>Name.PulseTimeout</b>	Get/Set Pulse Timeout for Loss of Signal	0 to 65535
<b>Name.PulsesPerRev</b>	Get/Set Pulses Per Revolution	0 to 9999
<b>Name.Counter</b>	Get/Set Unsigned Integer Value of the Counter. Pulse inputs Only	0 to 65535
<b>Name.LOS</b>	Loss of Signal flag set after time out. For Pulse inputs Only	False (Pulses ok), True (No Pulse Input)

## Output Group Selected as PWM Disabled:

Name	Description	Range
<b>HSEvenName</b>	Set the Bang-bang Coil to On or Off	Off, On
<b>HSEven#Name.OpenDisable</b>	Set the Enable or Disable Coil Open Detection	0 [Enabled], 1 [Disabled]
<b>HSEven#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSEven#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>HSOddName</b>	Set the Bang-bang Coil to On or Off	Off, On
<b>HSOdd#Name.OpenDisable</b>	Set the Enable or Disable Coil Open Detection	0 [Enabled], 1 [Disabled]
<b>HSOdd#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSOdd#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]



## Universal and Analog Input:

Name	Description	Range
<b>Name1</b>	Get 0 to 100% or 0 to 1023 counts regardless of direction	0% to 100% or 0 to 1023 counts
<b>(Min Volts to Center Volts)NameLo1</b>	Get 0 to 100% or 0 to 1023 counts of Min to (Center - Deadband) only if Center is enabled	0% to 100% or 0 to 1023 counts
<b>(Center Volts to Max Volts)NameHi1</b>	Get 0 to 100% or 0 to 1023 counts of (Center + Deadband) to Max only if Center is enabled	0% to 100% or 0 to 1023 counts
<b>Name.Dir</b>	Get the Upper or Lower Side of the Analog Input only if Center is enabled.  Lower Side voltage is lower than the Upper Side	False (Lower Side), True (Upper Side)
<b>Name.RawVolts</b>	Volts or mAmps (mA = universal input ma select)	0 to 1023 * Scale2
<b>Name.RefVolts</b>	Reference Volts = RefVolts * .00489	0 to 1023
<b>Name.RampVolts</b>	Ramped Volts = RampVolts * Scale Factor	0 to 1023 * Scale2
<b>Name.MinVolts</b>	When Name = 0% (i.e. Center not enabled)	0 to 1023 * Scale2
<b>Name.MaxVolts</b>	When Name = 100%	0 to 1023 * Scale2
<b>Name.MinLimit</b>	Threshold for Name.MinF	0 to 1023 * Scale2
<b>Name.MaxLimit</b>	Threshold for Name.MaxF	0 to 1023 * Scale2
<b>Name.RefMinLimit</b>	Threshold for Name.MinRF	0 to 1023 * Scale2
<b>Name.RefMaxLimit</b>	Threshold for Name.MaxRF	0 to 1023 * Scale2
<b>Name.CenterVolts</b>	Where Center Volts	0 to 1023 * Scale2
<b>Name.Deadbandv</b>	Plus and minus volts about CenterVolts	0 to 1023 * Scale2





Name	Description	Range
<b>NameX.RampUp</b>	RampUp * .01 = Time Min to Max (Seconds)	0.0 to 65.00 s
<b>NameX.RampDown</b>	RampDown * .01 = Time Max to Min (Seconds)	0.0 to 65.00 s
<b>NameX</b>	Where NameX = NameLo, NameHi if Center is enabled NameX = Name if Center is not enabled	
<b>Name.MinF</b>	Status Flag set if Voltage is less than Min Limit	False (ok), True (Outside Limit)
<b>Name.MaxF</b>	Status Flag set if Voltage is greater than Max Limit	Range: False (ok), True (Outside Limit)
<b>Name.MinRF</b>	Status Flag set if Voltage is less than Reference Min Limit	False (ok), True (Outside Limit)
<b>Name.MaxRF</b>	Status Flag set if Voltage is greater than Reference Max Limit	False (ok), True (Outside Limit)
<b>Name.LOS</b>	Loss of Signal flag set after time out. For Universal Pulse inputs Only	False (Pulses ok), True (No Pulse Input)
<b>Name.RealRPM</b>	The Unsigned Integer Value of the RPM. For Universal Pulse inputs Only	0 to 9999
<b>Name.Counter</b>	Get/Set Unsigned Integer Value of the Counter. Universal Pulse inputs Only	0 to 65535
<b>Name.PulsesPerRev</b>	Get/Set Pulses Per Revolution	0 to 9999

<sup>1</sup> Name is the actual name entered in the Input / Output configuration window.

<sup>2</sup>Scale depends on Input Range (0 to 5 = .00489, 0 to 10 = .00977, 0 to 25ma = 0.02158 )



## Output Group Selected as **Dual Coil** High-Side:

Name	Description	Range
<b>(Low-Side/PWM) Name</b>	Set the state Current Target or Process in percentage of min to max current	0% to 100% or 0 to 1023 counts
<b>Name.Dir</b>	Set the coil to be PWM'd, *(use High Side names to set the direction)	High-Side Odd # Name / High Side Even # Name
<b>Name.Enable</b>	Set the PWM to 0 or enable the PWM	True [PWM Enabled], False [PWM = 0]
<b>Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>HSEven#Name.Rampup</b>	Set the ramp up rate (time to travel from 0% to 100%)	0.0 to 65.00 s
<b>HSEven#Name.Rampdown</b>	Set the ramp down rate (time to travel from 100% to 0%)	0.0 to 65.00 s
<b>HSEven#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSEven#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>HSOdd#Name.Rampdown</b>	Set the ramp down rate (time to travel from 100% to 0%)	0.0 to 65.00 s
<b>HSOdd#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSOdd#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>Name.Cur</b>	Current actual * CurGain = amps	0 – 3.5 amps
<b>Name.RampCur</b>	Ramped Current*CurGain= amps	0 – 3.5 amps
<b>Name.CurErr</b>	Current Error = RampCur – Cur	16 bit signed integer



Name	Description	Range
<b>Name.CurSumErr</b>	Current Error accumulated over time	0 – 65535
<b>Name.CurP</b>	Current Proportional Term Constant “P”	0 – 255
<b>Name.CurI</b>	Current Proportional Term Constant “I”	0 – 255
<b>Name.MinCurA</b>	Minimum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.MaxCurA</b>	Maximum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.MinCurB</b>	Minimum Current Coil B *.001 = amps	0 – 3.5 amps
<b>Name.MaxCurB</b>	Maximum Current Coil B *.001 = amps	0 – 3.5 amps
<b>Name.Config</b>	Configuration Word –Output, Process, Coil	

### Output Group Selected as Single Coil High-Side:

Name	Description	Range
<b>Name</b>	Set the state Current Target or Process in percentage of min to max current 0 = 0 Current, .1% = Min Current, and 100% = Max Current	0% to 100% or 0 to 1023 counts
<b>Name.Enable</b>	Set the PWM to 0 or enable the PWM	True [PWM Enabled], False [PWM = 0]
<b>Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]



Name	Description	Range
<b>Name.Rampup</b>	Set the ramp up rate (time to travel from 0% to 100%)	0.0 to 65.00 s
<b>Name.Rampdown</b>	Set the ramp down rate (time to travel from 100% to 0%)	0.0 to 65.00 s
<b>HSEvenName</b>	Set the Bang-bang Coil to On or Off	Off, On
<b>HSEven#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSEven#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>HSOdd#Name.OpenDisable</b>	Set the Disable Coil Open Detection	0 [Enabled], 1 [Disabled]
<b>HSOdd#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSOdd#Name.Open</b>	Get/Set the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>Name.Cur</b>	Current actual * CurGain = amps	0 – 3.5 amps
<b>Name.RampCur</b>	Current ramped Current*CurGain= amps	0 – 3.5 amps
<b>Name.CurErr</b>	Current Error = RampCur – Cur	16 Signed Integer
<b>Name.CurSumErr</b>	Current Error accumulated over time	0 – 65535
<b>Name.CurP</b>	Current Proportional Term Constant “P”	0 – 255
<b>Name.CurI</b>	Current Proportional Term Constant “I”	0 – 255
<b>Name.MinCurA</b>	Minimum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.MaxCurA</b>	Maximum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.Config</b>	Configuration Word –Output, Process, Coil	



## Output Group Selected as Single Coil Low-Side:

Name	Description	Range
<b>Name</b>	Set the state Current Target or Process in percentage of min to max current 0 = 0 Current, .1% = Min Current, and 100% = Max Current	0% to 100% or 0 to 1023 counts
<b>Name.Enable</b>	Set the PWM to 0 or enable the PWM	True [PWM Enabled], False [PWM = 0]
<b>Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>Name.Rampup</b>	Set the ramp up rate (time to travel from 0% to 100%)	0.0 to 65.00 s
<b>Name.Rampdown</b>	Set the ramp down rate (time to travel from 100% to 0%)	0.0 to 65.00 s
<b>HSEvenName</b>	Set the Bang-bang Coil to On or Off	Off, On
<b>HSEven#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSEven#Name.Open</b>	Get the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>HSOddName</b>	Set the Bang-bang Coil to On or Off	Off, On
<b>HSOdd#Name.OpenDisable</b>	Set the Disable Coil Open Detection	0 [Enabled], 1 [Disabled]
<b>HSOdd#Name.Short</b>	Get the Coil Flag for Short Status	Off [Coil Ok], On [Coil Short]
<b>HSOdd#Name.Open</b>	Get/Set the Coil Flag for Open Status	Off [Coil Ok], On [Coil Open]
<b>Name.Cur</b>	Current actual * CurGain = amps	0 – 3.5 amps
<b>Name.RampCur</b>	Current ramped Currend*CurGain= amps	0 – 3.5 amps
<b>Name.CurErr</b>	Current Error = RampCur – Cur	16 Signed Integer
<b>Name.CurSumErr</b>	Current Error accumulated over time	0 – 65535
<b>Name.CurP</b>	Current Proportional Term Constant “P”	0 – 255



## Status LED:

Name	Description	Range
BlinkCode	The Status LED blinks the amount of times equal to the number written to this location. When the blinking is done, the value for this location will be 0.	0 to 65535

## Power Supply:

Name	Description
Supply	The Power Supply voltage. This variable will return counts of 0 to 1023 for a scale of 0 to 35.2 VDC

## Temperature:

Name	Description
DVC_Temperature	Internal DVC5/7 controller temperature. The value returned is in units of degrees C + 40. Therefore, -40 C is returned as 0.

## Continuous Counter:

Name	Description
FreeRunningTimer	16 bit counter that continually increments every 100 micro second. Counts from 0 to 65535 (6.5 seconds) then begins again. Could be used to show timing between two events, as long as these events were within 6.5 seconds.

## DVC Mac ID:

Name	Description
MACID	This variable returns the Mac ID of the DVC controller.

## Coil Gains:

Name	Description
HC_Coil_Gain_OG1 to OG3 LC_Coil_Gain_OG1 to OG3	These variables return the coil gain constant used by the BIOS to determine actual coil current from analog to digital values derived by the controller's processor. You use these values if you wish to dynamically change maximum and minimum current setting in your application. Max_cur = (current_in_ma * 100)/HC_Coil_Gain_OG1



## Enable Process PI Variables:

### NOTES:

- The Name field is the Low-Side name. The default variable name is replaced with the specified name.
- **Setpoint and Feedback MUST have the same units.**

Name	Description	Range
<b>Name.Setpoint</b>	The desired % set point position for the output	0% to 100% or 0 to 1023 counts
<b>Name.Feedback</b>	The % feedback position for the output	0% to 100% or 0 to 1023 counts
<b>Name.ProErr</b>	Error = Set point – Feedback	16 bit signed integer
<b>Name.ProSumErr</b>	Error accumulated over time	0 – 65535
<b>Name.ProP</b>	Process Proportional Term Constant “P”	0 – 255
<b>Name.ProI</b>	Process Proportional Term Constant “I”	0 – 255
<b>Name.ProItime</b>	Update / Integration Time	0.0 to 650.00 s
<b>Name.Cur</b>	Current actual * CurGain = amps	0 – 3.5 amps
<b>Name.RampCur</b>	Current ramped Current*CurGain= amps	0 – 3.5 amps
<b>Name.CurErr</b>	Current Error = RampCur – Cur	16 bit signed integer
<b>Name.CurSumErr</b>	Current Error accumulated over time	0 – 65535
<b>Name.CurP</b>	Current Proportional Term Constant “P”	0 – 255
<b>Name.CurI</b>	Current Proportional Term Constant “I”	0 – 255
<b>Name.MinCurA</b>	Minimum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.MaxCurA</b>	Maximum Current Coil A *.001 = amps	0 – 3.5 amps
<b>Name.MinCurB</b>	Minimum Current Coil B *.001 = amps	0 – 3.5 amps
<b>Name.MaxCurB</b>	Maximum Current Coil B *.001 = amps	0 – 3.5 amps
<b>Name.Config</b>	Configuration Word – Output, Process, Coil	



## Input / Output Functions:

Name	Description	Range
<b>Name.In</b>	Changing this variable will update the "Name.Out" variable by the BIOS after a delay of 10ms	0% to 100% or 0 to 1023 counts
<b>Name.Out</b>	The Output of the Transfer Function	0% to 100% or 0 to 1023 counts
<b>Name.X0</b>	The X0 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X1</b>	The X1 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X2</b>	The X2 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X3</b>	The X3 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X4</b>	The X4 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X5</b>	The X5 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X6</b>	The X6 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.X7</b>	The X7 of the input function	0% to 100% or 0 to 1023 counts
<b>Name.Y0</b>	The Y0 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y1</b>	The Y1 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y2</b>	The Y2 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y3</b>	The Y3 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y4</b>	The Y4 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y5</b>	The Y5 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y6</b>	The Y6 of the output function	0% to 100% or 0 to 1023 counts
<b>Name.Y7</b>	The Y7 of the output function	0% to 100% or 0 to 1023 counts





**Table of definitions used in this manual:**

<b>Definition</b>	<b>Description</b>	<b>Units</b>	<b>Notes</b>
<b>Bang Bang</b>	<b>ON/OFF valve or output with NO ramps</b>	-	
<b>PWM</b>	<b>Pulse Width Modulation</b>	<b>%</b>	<b>Efficient method of driving coils</b>



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*High Country Tek Inc. was started in 1980 as a high quality contract electronics manufacturing company and we have grown over the years to expand not only this aspect of our business, but also moving into the arena of providing our many successful customers with innovative and elegant electro-hydraulic control solutions.*

*We are able to offer our own cost effective range of dedicated function, specialty controllers for systems such as Hydraulic fan drives and mobile generator control, as well as a comprehensive range of industry leading ruggedized user configurable, digital modules that can be combined and programmed to realize even the most difficult and expansive systems.*

*We initiate and manage both the hardware and software design with our in-house team of experienced engineering staff from the head office in Nevada City, CA. and have several industry experienced Field application engineers placed around the country able to support and work with you on projects from concept to fulfillment.*

*High Country Tek Inc. is known for product quality, pioneering technology and second to none customer service. Please visit our website ( [www.highcountrytek.com](http://www.highcountrytek.com) ) to see our full product capabilities or contact us with your immediate or future control needs, we would be glad to work with you.*

*Thank you for using High Country Tek Inc. products.*