



CDHD2 Servo Drive Operator Panel (HMI)

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1 Operator Panel (HMI) Overview

The CDHD2 operator panel is an HMI (human-machine interface) that allows you to monitor and edit parameter values, execute commands, and perform drive diagnostics and troubleshooting.

While COMMODE 0 is in effect, the drive can be fully controlled (enabled, motor movement, parameter modification) by both the operator panel and ServoStudio. Neither the operator panel nor ServoStudio takes precedence.

Functions performed in the operator panel and in ServoStudio are recognized by each other, but modifications to certain values, states and mode are not automatically displayed in the other. Changes made from the panel might not appear in a ServoStudio task screen until the screen is refreshed (exited and reopened).

When COMMODE 1 is in effect, the drive cannot be enabled and the motor cannot be moved through the operator panel or ServoStudio. The operator panel can only be used to manipulate parameters that do not interfere with fieldbus operation. If you attempt to set a parameter that interferes with fieldbus operation, the drive will issue an error code in the operator panel and/or an error message in ServoStudio.

The operator panel has a 5-digit 7-segment LED display, and four control keys.

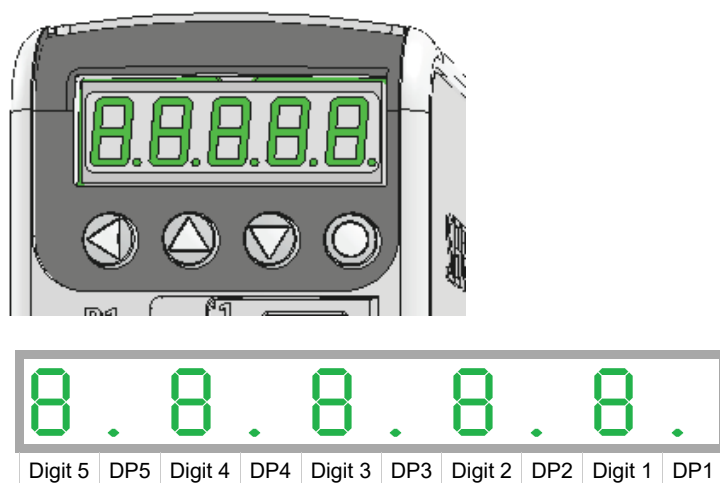










Figure 1-1. Five Digit 7-Segment Display and Keypad

Table 1-2. Operator Panel Control Keys

Key	Name	Function
	Mode	<ul style="list-style-type: none"> Switches to next panel display mode (Status > Parameter > Command > Monitor > Fault > Status). While editing, cancels the edited value and returns to mode menu.
	Shift Enter	<ul style="list-style-type: none"> Moves the cursor one digit to the left. Press short: Shows the value of the currently selected parameter, and enables editing and setting of the parameter value. Press long: Applies parameter number or value
	Up	<p>Parameter:</p> <ul style="list-style-type: none"> Press once: Navigates up to next parameter. Press continuously: Quickly scrolls through ascending parameter indices. Speed of scrolling increases the longer the key is pressed. <p>Value:</p> <ul style="list-style-type: none"> Increases value by one increment
	Down	<p>Parameter:</p> <ul style="list-style-type: none"> Press once: Navigates down to next parameter. Press continuously: Quickly scrolls through descending parameter indices. Speed of scrolling increases the longer the key is pressed. <p>Value:</p> <ul style="list-style-type: none"> Decreases value by one increment
	Mode	<ul style="list-style-type: none"> Scrolls to next panel display mode. While editing, cancels the edited value and moves to next panel mode.
	Shift + Mode	<p>Long press (>0.5 second)</p> <p>Applies parameter value and executes CONFIG.</p> <p>>> done</p>
	Shift + Mode	<p>Very long press (>2 seconds)</p> <p>Executes CONFIG after one second, then executes SAVE after two seconds.</p> <p>>> done</p>

Operator Panel Modes

Use the Mode  button to scroll through the five digital display modes.

The operator panel has five modes.

Table 1-3. Operator Panel Modes

Status (S)	S	Mode for displaying drive status, operating mode, warnings and motor movement. Refer to Operator Panel – Status Mode . Also refer to <i>Digital Display – Warning Codes</i> in the CDHD2 User Manual.
Parameters	P	Mode for reading and writing values of drive parameters. Refer to the VarCom Reference Manual.
Command	C	Mode for executing drive commands. Refer to Operator Panel – Command Mode .
Monitoring	d	Mode for displaying drive and system variables, such as actual speed, position, input and output states. Refer to Operator Panel – Monitoring Mode .
Faults & Info	F	Mode for displaying fault codes and system information. Refer to Operator Panel – Faults & Info Mode .

The drive remembers the last selected setting or value in each mode.

If one or more faults occurs while in Status, Commands or Monitoring mode, the digital display automatically switches to Faults mode, and the most recent fault number is displayed. To resume working, a different display mode must be selected.

While in Parameters mode, an incorrect value will cause an error code to be displayed, but the digital display will not switch modes.

Operator Panel – Status Mode

The Status mode is indicated by the character **S** in digit 5.

In Status mode, the digital display indicates the state of the drive, the drive operating mode, drive enabled/disabled status, warnings, and motor movement.

The drive always powers up in Status mode, and indicating the operating mode in effect.

While the operating mode is displayed, DP1 is lit if the drive is enabled; DP1 is off if the drive is disabled.



HMI Status Codes

Status codes are shown in the table below. Also refer to *Digital Display – Warning Codes* in the CDHD2 User Manual.

Table 1-4. Digital Display Status Codes

Digit or DP	Display	Description
DP 1	.	Drive enabled
	.	Drive disabled
Digits 1 and 2		Operating mode, depending on COMMODE.
		If COMMODE 0: Analog/P&D/Serial (OPMODE)
	00	0 = Velocity control, using serial commands
	01	1 = Velocity control, using analog input
	02	2 = Current control, using serial commands
	03	3 = Current control, using analog input
	04	4 = Position control, using gearing input
	08	8 = Position control, using serial commands
		If COMMODE 1: (Object 6061)
	PP	1 = Profile Position mode
	PS	3 = Profile Velocity mode
	Pt	4 = Profile Torque mode
	HH	6 = Homing mode
	SP	8 = Cyclic Synchronous Position mode
	SS	9 = Cyclic Synchronous Velocity mode
	St	10 = Cyclic Synchronous Torque mode
DP 2	.	EtherCAT/CANopen OP mode active
	.	EtherCAT/CANopen INIT mode
Digit 3	r	Motor is moving
	.	Motor is not moving
Digit 4	#	First character of a warning code.
	.	No faults or warnings
Digit 5	S	Status mode. Displays the codes shown in this table.
	P	Parameter mode. Refer to Operator Panel – Parameter Mode and to the VarCom Reference Manual.
	C	Command mode. Refer to Operator Panel – Command Mode .
	d	Monitoring mode. Refer to Operator Panel – Monitoring Mode .
	F	Faults & Information mode Refer to Operator Panel – Faults & Info Mode .

HMI Special Status Codes

Power Up

During power up, the digital display shows 5 dashes.



This code is also displayed when the Ember switch is activated, which sets the drive to serial communication Boot-Up mode.

Ember Mode

During the firmware update process, the digital display shows:



2 Operator Panel – Parameter Mode

The Parameter mode is indicated by the character **P** in digit 5.

In Parameter mode, the digital display shows the value of drive parameters, and the panel is used to edit the values of drive parameters.



done indicates that a parameter has been set.

In Parameter mode, DP5 is lit to indicate the parameter is read only; for example, the value of Analog Output (P4219):



When editing in Parameter mode, an invalid value will cause an error message code to be displayed. (The panel does not switch to Fault mode.)

Error messages resulting from parameter manipulation are indicated by E followed by a two or three digit error code. Refer to *Error Messages* in the CDHD2 User Manual.



If CONFIG is required after a parameter value is entered, the display will flash.


CONFIG can be issued by a long press on Shift + Mode keys, or by command C0005, or through the ServoStudio interface.

Setting a Parameter - Example

Code	P0018
Parameter	Motor Direction
VarCom	DIR
Sequence	Press: Mode Select: (up/down) Parameter mode Display: P0000 Select: (up/down) P0018 Press: Shift Display: 00000 , flashing digit Select: (up/down) parameter value; for example: 3 Display: 00003 , flashing 3 Press: Long Shift + Mode (0.5 second) to apply value and execute CONFIG. or Press: Very Long Shift + Mode (2 seconds) for CONFIG and SAVE. Done: done






HMI Parameter Value Manipulation

The digital display can present parameter values up to $\pm 9,223,372,036,854,775,807.000$

The first string is displayed by default. To view the second, third and fourth strings, press the Shift key  repeatedly, until the display shows the next string.

The string can be recognized by the DPs that are lit:

- DP1: first string (integer value)
- DP1 + DP4: first string (value with 3 decimal places)
- DP1 + DP2: second string
- DP1 + DP2 + DP3: third string
- DP1 + DP2 + DP3 + DP4: fourth string

First string	Second string	Third string	Fourth string
integers up to 99999	numerals in values up to 9,999,999.xxx	numerals in values up to 999,999,999,999.xxx	numerals in values up to 99,999,999,999,999,999.xxx
			
or values up to 99.999			
			

Note that the first string might show 00.000. while the value of the parameter is shown and set in the second string; for example, if acceleration parameter (ACC/P0014) = 40000.000 [rpm/s]:

- First string:



- Shift to second string:



HMI Parameter Codes

Table 2-1. Parameter Groups

Parameter Group	Description
Basic - most frequently used	Starting at index 0000
Gains and Filters	Starting at index 1000
Shaping Filters	Starting at index 1100
Linear Loop Gains	Starting at index 1200

Parameter Group	Description
Current Loop Gains	Starting at index 1300
Feedback	Starting at index 2000
Secondary Feedback	Starting at index 2100
Motor	Starting at index 3000
Digital I/Os	Starting at index 4000
Analog I/Os	Starting at index 4100
Limits	Starting at index 5000
Communication/Fieldbus	Starting at index 6000
Drive Parameters and Foldback	Starting at index 7000
Emergency stop	Starting at index 7100
Homing	Starting at index 7200
Faults Modes and Thresholds	Starting at index 7300

Table 2-2. Parameter Codes

Parameter	Description	Code
Basic - most frequently used	Starting at index 0000	
COMMODE	Communication Mode	P0000
OPMODE	Drive Operation Mode	P0001
GEARMODE	Gearing Operation Mode	P0002
ADDR	Drive Communication Address	P0003
XENCRES	External Encoder Resolution	P0004
GEARIN	Gear Ratio Numerator	P0005
GEAROUT	Gear Ratio Divider	P0006
ENCOUTRES	Encoder Simulation Line Resolution	P0007
ENCOUTMODE	Encoder Simulation Mode	P0008
ANIN1VSCALE	Analog Input 1 Velocity Scaling	P0009
ANIN1ISCALE	Analog Input 1 Current Scaling	P0010
ILIM	User Current Limit	P0011
VLIM	User Velocity Limit	P0012
VBUS	Bus Voltage (DC)	P0013
ACC	Acceleration	P0014
DEC	Deceleration	P0015
DISMODE	Disable Mode	P0016
DECSTOP	Active Disable Deceleration	P0017
DIR	Feedback Direction	P0018
MFBDIR	Motor and Feedback Direction	P0019
MPHASE	Commutation Offset	P0020
PFBOFFSET	Position Offset	P0021
UNITSROTPOS	Units Rotary Position	P0022

Parameter	Description	Code
UNITSROTACC	Units Rotary Acc/Dec	P0023
UNITSROTVEL	Units Rotary Velocity	P0024
UNITSLINPOS	Units Linear Position	P0025
UNITSLINACC	Units Linear Acc/Dec	P0026
UNITSLINVEL	Units Linear Velocity	P0027
Gains and Filters	Starting at index 1000	
POSCONTROLMODE	Position Loop Controller Mode	P1000
VELCONTROLMODE	Velocity Loop Controller	P1001
KNLUSERGAIN	HD Global Gain	P1002
KNLD	HD Derivative Gain	P1003
KNLP	HD Proportional Gain	P1004
KNLIV	HD Derivative-Integral Gain	P1005
KNLI	HD Integral Gain	P1006
KNLAFRC	HD Acceleration Feedforward	P1007
NLPEAFF	HD Flexibility Compensation	P1008
NLAFFLPFHZ	HD Spring Filter	P1009
NLFILTT1	HD Current Filter Low Pass Rise Time	P1010
NLFILTDAMPING	HD Current Filter Damping	P1011
NLMAXGAIN	HD Maximum Adaptive Gain	P1012
NLNOTCHCENTER	HD Current Filter Notch Center	P1013
NLNOTCHBW	HD Current Filter Notch Bandwidth	P1014
NLNOTCH2CENTER	HD Current Filter 2nd Notch Center	P1015
NLANTIVIBSHARP	HD AV 1 Filter Sharpness	P1016
NLANTIVIBGAIN2	HD Anti-Vibration 2 Filter ? Gain	P1017
NLANTIVIBHZ2	HD AV 2 Filter Center Frequency	P1018
NLANTIVIBSHARP2	HD AV 2 Filter Sharpness	P1019
NLANTIVIBGAIN3	HD Anti-Vibration 3 Filter ? Gain	P1020
NLANTIVIBHZ3	HD AV 3 Filter Center Frequency	P1021
NLANTIVIBSHARP3	HD AV 3 Filter Sharpness	P1022
Shaping Filters	Starting at index 1100	
MOVESMOOTHMODE	Position Command Smoothing Mode	P1100
MOVESMOOTHSRC	Position Command Smoothing Source	P1101
MOVESMOOTHAVG	Position Command Moving Avg Filter	P1102
MOVESMOOTHLPFHZ	Position Command Move Low Pass Filter	P1103
GEARFILTMODE	Gear Filter Mode	P1104
GEARFILTT1	Gear Filter Depth	P1105
GEARFILTT2	Gear Filter Vel and Acc Depth	P1106
GEARACCTHRESH	Gear Acceleration Threshold	P1107

Parameter	Description	Code
GEARFILTVELFF	Gear Filter Velocity Feedforward	P 1108
GEARFILTAFF	Gear Filter Acceleration FF	P 1109
Linear Loop Gains	Starting at index 1200	
KVP	Velocity Proportional Gain	P 1200
KVI	Velocity Integral Gain	P 1201
KVFR	Velocity Feedforward Ratio	P 1202
FILTMODE	Velocity Loop Output Filter Mode	P 1203
FILTHZ1	Velocity Loop Output Filter Param 1	P 1204
FILTHZ2	Velocity Loop Output Filter Param 2	P 1205
VELFILTMODE	Velocity Filter Mode	P 1206
KPP	Position Proportional Gain	P 1207
KPI	Position Integral Gain	P 1208
KPISATIN	Position Integral Saturation Input	P 1209
KPISATOUT	Position Integral Saturation Output	P 1210
KPD	Position Derivative Gain	P 1211
KPE	Position Adaptive Proportional Gain	P 1212
KPVFR	Position Velocity Feedforward	P 1213
KPAFRC	Position Acc FF to Current Loop	P 1214
KPAFRV	Position Acceleration Feedforward	P 1215
Current Loop Gains	Starting at index 1300	
KCP	Current KP Gain	P 1300
KCI	Current KI Gain	P 1301
KCD	Dead Time Compensation Min Level	P 1302
KCFF	Current KFF Gain	P 1303
KCBEMF	Current BEMF Compensation Gain	P 1304
KCMODE	Current Loop Compatibility Mode	P 1305
MLGAINP	Adaptive Gain at Peak Motor Current	P 1307
MLGAINC	Adapt Gain at Continuous Motor Current	P 1308
MTANGLC	Torque Angle at Motor Continuous Current	P 1308
MTANGLP	Torque Angle at Motor Peak Current	P 1309
FRICINEG	Friction Compens Negative Current	P 1310
FRICIPOS	Friction Compens Positive Current	P 1311
FRICNVHYST	Friction Compens Neg Vel Hysteresis	P 1312
FRICPVHYST	Friction Compens Neg Vel Hysteresis	P 1313
I	Motor Current	P 1314
ICMD	Current Command	P 1315
ID	Current D Axis	P 1316
IFFLPHZ	Current Feedforward Low Pass Filter	P 1317

Parameter	Description	Code
IGRAV	Gravity Compensation	P 13 18
IMAX	Drive Current Limit	P 13 19
IQ	Current Q Axis	P 13 20
IU	Phase U Actual Current	P 13 21
IUOFFSET	Phase U Current Offset	P 13 22
IV	Phase V Actual Current	P 13 23
IVOFFSET	Phase V Current Offset	P 13 24
Feedback	Starting at index 2000	
FEEDBACKTYPE	Feedback Type	P 20 00
MENCRES	Motor Encoder Resolution	P 20 01
MENCTYPE	Motor Encoder Type	P 20 02
MSININT	Motor Sine Interpolation	P 20 03
BISSCFIELDS (argument 1)	Multi-turn Data (bits)	P 20 04
BISSCFIELDS (argument 2)	Effective Multi-turn Data (bits)	P 20 05
BISSCFIELDS (argument 3)	Single Turn Data (bits)	P 20 06
BISSCFIELDS (argument 4)	Effective Single Turn Data (bits)	P 20 07
RESBW	Resolver Conversion Bandwidth	P 20 08
HALLSINV	Hall Signals Inversion	P 20 09
HALLSTYPE	Hall Signals Type	P 20 10
PHASEFINDMODE	Phase Find Mode	P 20 11
PHASEFINDI	Phase Find Current	P 20 12
PHASEFINDTIME	Phase Find Duration	P 20 13
PHASEFINDGAIN	Phase Find Gain	P 20 14
HALLSCOMMTHRESH	Halls-Only Commutation Source Switch	P 20 15
HALLSONLYCOMM	Halls-Only Commutation Source	P 20 16
HALLSFILTAFF	Halls-Only MSQ Filter Acc FF	P 20 17
HALLSFILTT1	Halls-Only MSQ Filter Depth	P 20 18
HALLSFILTT2	Halls-Only MSQ Filter Vel and Acc	P 20 19
HALLSFILTVELFF	Halls-Only MSQ Filter Velocity FF	P 20 20
HWPOS	Hardware Position	P 20 21
MECHANGLE	Motor Angle	P 20 23
MENCAQBFILT	Motor Encoder A/B Quadrature Filter	P 20 24
MENCZPOS	Motor Encoder Index Position	P 20 25
MFBMODE	Motor Feedback Mode	P 20 26
MRESPOLES	Motor Resolver Poles	P 20 27
RESAMPLRANGE	Resolver Amplitude Range	P 20 28
SININITMODE	Sine/Cosine Calibration Mode	P 20 29
TMTEMP	Tamagawa Temperature	P 20 30

Parameter	Description	Code
INDEXDURATE	Simulated Encoder Index Pulse Duration	P 2 0 3 2
Secondary Feedback	Starting at index 2100	
HWPEXT	Hardware Position External	P 2 1 0 0
HWPEXTCNTRLR	Hardware Position External (FPGA)	P 2 1 0 1
HWPEXTMACHN	Hardware Position External (DSP)	P 2 1 0 2
SFB	Secondary Feedback	P 2 1 0 3
SFBMODE	Secondary Feedback Mode	P 2 1 0 7
SFBOFFSET	Secondary Feedback Offset	P 2 1 0 8
SFBTYPE	Secondary Feedback Type	P 2 1 1 3
LMUNITSDEN	Motor to Load Scaling Denominator	P 2 1 1 4
LMUNITSNUM	Motor to Load Scaling Numerator	P 2 1 1 5
Motor	Starting at index 3000	
MOTORNAME	Motor Name	P 3 0 0 0
MOTORTYPE	Motor Type	P 3 0 0 1
MICONT	Motor Continuous Current	P 3 0 0 2
MIPEAK	Motor Peak Current	P 3 0 0 3
MSPEED	Motor Maximum Speed	P 3 0 0 4
MPOLES	Motor Poles	P 3 0 0 5
MPITCH	Motor Pitch	P 3 0 0 6
MKT	Torque Constant	P 3 0 0 7
MKF	Torque Constant for Linear Motor	P 3 0 0 8
ML	Motor Inductance	P 3 0 0 9
MR	Motor Resistance	P 3 0 1 0
MOTORCOMMTYPE	Motor Commutation Type	P 3 0 1 1
MFOLD	Motor Foldback Status	P 3 0 1 2
MFOLDD	Motor Foldback Delay Time	P 3 0 1 3
MFOLDDIS	Motor Foldback Disable	P 3 0 1 4
MFOLDF	Motor Foldback Factor	P 3 0 1 5
MFOLDR	Motor Foldback Recovery Time	P 3 0 1 6
MFOLDT	Motor Foldback Time Constant	P 3 0 1 7
MIFOLD	Motor Foldback Current	P 3 0 1 8
MIFOLDFTHRESH	Motor Foldback Fault Threshold	P 3 0 1 9
MTPMODE	Electronic Motor Nameplate Mode	P 3 0 2 0
Digital I/Os	Starting at index 4000	
INMODE 1	Input Mode (input 1)	P 4 0 0 0
INMODE 2	Input Mode (input 2)	P 4 0 0 1
INMODE 3	Input Mode (input 3)	P 4 0 0 2
INMODE 4	Input Mode (input 4)	P 4 0 0 3

Parameter	Description	Code
INMODE 5	Input Mode (input 5)	P 4004
INMODE 6	Input Mode (input 6)	P 4005
INMODE 7	Input Mode (input 7)	P 4006
INMODE 8	Input Mode (input 8)	P 4007
INMODE 9	Input Mode (input 9)	P 4008
INMODE 10	Input Mode (input 10)	P 4009
INMODE 11	Input Mode (input 11)	P 4010
ININV 1	Input Inversion (input 1)	P 4011
ININV 2	Input Inversion (input 2)	P 4012
ININV 3	Input Inversion (input 3)	P 4013
ININV 4	Input Inversion (input 4)	P 4014
ININV 5	Input Inversion (input 5)	P 4015
ININV 6	Input Inversion (input 6)	P 4016
ININV 7	Input Inversion (input 7)	P 4017
ININV 8	Input Inversion (input 8)	P 4018
ININV 9	Input Inversion (input 9)	P 4019
ININV 10	Input Inversion (input 10)	P 4020
ININV 11	Input Inversion (input 11)	P 4021
OUTMODE 1	Output Mode (output 1)	P 4022
OUTMODE 2	Output Mode (output 2)	P 4023
OUTMODE 3	Output Mode (output 3)	P 4024
OUTMODE 4	Output Mode (output 4)	P 4025
OUTMODE 5	Output Mode (output 5)	P 4026
OUTMODE 6	Output Mode (output 6)	P 4027
OUTMODE 7	Output Mode (output 7)	P 4028
OUTINV 1	Output Inversion (output 1)	P 4029
OUTINV 2	Output Inversion (output 2)	P 4030
OUTINV 3	Output Inversion (output 3)	P 4031
OUTINV 4	Output Inversion (output 4)	P 4032
OUTINV 5	Output Inversion (output 5)	P 4033
OUTINV 6	Output Inversion (output 6)	P 4034
OUTINV 7	Output Inversion (output 7)	P 4035
ENCOUTZPOS	Encoder Simulation Index Position	P 4036
IN32OPMODES	Operation Mode Change Input Level	P 4037
IN32SWITCH	Operation Mode Change Resume Motion	P 4038
JOGSPD1	Jog Speed 1 Triggered by Input	P 4039
JOGSPD2	Jog Speed 2 Triggered by Input	P 4040
OUTBRAKE	Manual Brake by Output	P 4041

Parameter	Description	Code
OUTBRAKEINV	Manual Brake by Output Inverse	P 4042
OUTBRAKEMODE	Manual Brake by Output Mode	P 4043
OUTFLTlvl	Force Digital Output State on Fault	P 4044
OUTILVL1	Current 1 Digital Output Definition	P 4045
OUTILVL2	Current 2 Digital Output Definition	P 4046
OUTINV	Position 1 Digital Output Definition	P 4047
OUTPLVL2	Position 2 Digital Output Definition	P 4048
OUTVLVL1	Velocity 1 Digital Output Definition	P 4049
OUTVLVL2	Velocity 2 Digital Output Definition	P 4050
RELAY	Fault Relay Status	P 4051
RELAYMODE	Fault Relay Mode	P 4052
Analog I/Os	Starting at index 4200	
ANIN1DB	Analog Input 1 Deadband	P 4200
ANIN1FILTAFF	Analog Input 1 MSQ 2nd Deriv FF	P 4201
ANIN1FILTIN	Analog Input 1 Before MSQ Filter	P 4202
ANIN1FILTMODE	Analog Input 1 MSQ Filter	P 4203
ANIN1FILTT1	Analog Input 1 MSQ Filter Depth	P 4204
ANIN1FILTT2	Analog Input 1 MSQ 1st 2nd Deriv	P 4205
ANIN1FILTVELFF	Analog Input 1 MSQ 1st Deriv FF	P 4206
ANIN1LPFHZ	Analog Input 1 Filter	P 4207
ANIN1OFFSET	Analog Input 1 Offset	P 4208
ANIN2DB	Analog Input 2 Deadband	P 4209
ANIN2ISCALE	Analog Input 2 Current Scaling	P 4210
ANIN2LPFHZ	Analog Input 2 Filter	P 4211
ANIN2MODE	Analog Input 2 Mode	P 4212
ANIN2OFFSET	Analog Input 2 Offset	P 4213
ANIN2USER	Analog Input 2 Voltage User Units	P 4214
ANIN2USERDEN	ANIN2USER Conversion Denominator	P 4215
ANIN2USERNUM	ANIN2USER Conversion Numerator	P 4216
ANIN2USEROFFSET	ANIN2USER Conversion Offset	P 4217
ANIN2ZERO	Analog Input 2 Zero Command	P 4218
ANOUT	Analog Output Value	P 4219
ANOUTCMD	Analog Output Command	P 4220
ANOUTISCALE	Analog Output Current Scaling	P 4221
ANOUTLIM	Analog Output Voltage Limit	P 4222
ANOUTMODE	Analog Output Mode	P 4223
ANOUTVSCALE	Analog Output Velocity Scaling	P 4224

Parameter	Description	Code
Limits	Starting at index 5000	
LIMSWITCHNEG	Limit Switch Negative Status	P 5000
LIMSWITCHPOS	Limit Switch Positive Status	P 5001
GEARLIMITSMODE	Electronic Gearing Mode	P 5002
POSLIMHYST	SW Position LS Hysteresis Value	P 5003
POSLIMMODE	Position Limiting Mode	P 5004
POSLIMNEG	Minimum Software Position Limit	P 5005
POSLIMPOS	Maximum Software Position Limit	P 5006
ILIMACT	Drive Actual Current Limit	P 5007
Communication/Fieldbus	Starting at index 6000	
BAUDRATE	Serial Baud Rate	P 6000
CANBITRATE	CAN Bus Bit Rate	P 6001
CHECKSUM	Checksum	P 6002
ECHO	Serial Communication Character Echo	P 6003
PNUM	Feed Constant Scaling Numerator	P 6004
FBGDS	Fieldbus Gear Driving Shaft Scaling	P 6006
FBGMS	Fieldbus Gear Motor Shaft Scaling	P 6007
FBITIDX	Fieldbus Interpolation Time Index	P 6008
FBITPRD	Fieldbus Interpolation Time	P 6009
FBPLIGNORE	Fieldbus Ignore Packet Loss Fault	P 6010
FBSCALE	Fieldbus Unit Scaling	P 6011
MSGPROMPT	Drive Messages and Prompts	P 6012
Drive Parameters and Foldback	Starting at index 7000	
DICONT	Drive Continuous Current	P 7000
DIPEAK	Drive Peak Current	P 7001
FOLD	Drive Foldback Status	P 7002
IFOLD	Drive Foldback Current Limit	P 7003
IFOLDFTHRESH	Drive Foldback Fault Threshold	P 7004
IFOLDWTHRESH	Drive Foldback Warning Threshold	P 7005
IZERO	Zero Procedure Current	P 7006
Emergency Stop	Starting at index 7100	
DECSTOPTIME	Active Disable Deceleration Time	P 7102
DISSPEED	Active Disable Speed Threshold	P 7103
DISTIME	Active Disable Time	P 7104
ESTOPI LIM	Current Limit During Emergency	P 7105
HOLD	Hold Position Command	P 7106
ISTOP	Dynamic Braking Current	P 7107
COMMERRMAXCNT	Commutation Error Counter	P 7108

Parameter	Description	Code
COMMERRTTHRESH	Commutation Error Threshold	P7109
COMMERRVTHRESH	Commutation Velocity Deviation	P7110
STALLTIME	Stall Time	P7111
STALLVEL	Stall Velocity	P7112
Homing	Starting at index 7200	
HOMETYPE	Homing Type	P7200
HOMECMDST	Homing Process Status	P7202
HOMEIHARDSTOP	Current for Homing on Hard Stop	P7203
HOMEOFFSET	Home Offset	P7204
HOMEOFSTMOVE	Home Offset Move	P7205
HOMESPEED1	Homing Speed 1 - Switch Search	P7206
HOMESPEED2	Homing Speed 2 - Index Search	P7207
HOMESTATE	Homing Status	P7208
Faults Modes and Thresholds	Starting at index 7300	
UVMODE	Under-Voltage Mode	P7300
UVRECOVER	Under-Voltage Recovery Mode	P7301
UVTHRESH	Under-Voltage Threshold	P7302
UVTIME	Under-Voltage Time	P7303
IGNOREBRKFLT	Ignore Power Brake Fault	P7304
LINELOSSMODE	Bus AC Supply Line Disconnect Mode	P7305
LINELOSSRECOVER	Bus AC Disconnect Recovery Mode	P7306
LINELOSSTYPE	Bus AC Supply Line Disconnect Type	P7307
OVTHRESH	Over-Voltage Threshold	P7308
PWMFRQ	PWM Frequency	P7309
REGENFLTMODE	Regeneration Resistor Fault Mode	P7310
REGENMAXONTIME	Regeneration Resistor Max On Time	P7311
REGENMAXPOW	Regeneration Resistor Maximum Power	P7312
REGENPOW	Regeneration Resistor Power	P7313
REGENRES	Regeneration Resistor Resistance	P7314

3 Operator Panel – Command Mode

The Command mode is indicated by the character **C** in digit 5.

In Command mode, the panel is used to issue commands to the drive.



If an invalid command argument is entered, an error message code will be displayed. Error messages resulting from parameter manipulation are indicated by **Er** followed by a two or three digit error code.



For the full list of error message codes, refer to *Error Messages* in the CDHD2 User Manual.

HMI Command Codes

Command codes are shown in the table below.


The sequences for entering the commands are presented in the sections that follow.

When selecting/entering a command, 0 often flashes once in digit 1. This is standard behavior of the panel, indicating a value can be entered.


Table 3-1. Command Codes

Command - VarCom	Description	Code
HDTUNE	Initiate Drive-based Autotuning	C0000
MOTORSETUP	Motor Setup Command	C0001
CLEARFAULTS	Clear Faults	C0002
EN / K	Enable/Disable	C0003
J	Jog Command	C0004
CONFIG	Configure Drive	C0005
SAVE	Save Parameters	C0006
MTTURNRESET	Encoder Multi-Turn Reset	C0007
FACTORYRESTORE	Restore Factory Settings	C0008
ANIN1ZERO	Analog Input 1 Zero Command	C0009
MOVEABS	Move Absolute Command	C0010
MOVEINC	Move Incremental Command	C0011
HOMECMD	Homing Command	C0012
PHASEFIND	Phase Find Command	C0013
SININIT	Sine/Cosine Calibration Command	C0014

Autotuning

Code	C0000																
Command	Initiate Drive-based Autotuning																
VarCom	HDTUNE																
Sequence	<p>Make sure the drive is disabled, and has no faults</p> <p>Select: C0000</p> <p>Press: Shift</p> <p>Display: Atune</p>  <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Insert a value that represents the autotuning options:</p> <table border="1"> <tbody> <tr> <td>0</td><td>Internal Motion Generator – Express, drive-based</td></tr> <tr> <td>1</td><td>Internal Motion Generator – Advanced, drive-based</td></tr> <tr> <td>2</td><td>Internal Motion Generator – Advanced, for vertical applications, drive-based</td></tr> <tr> <td>10</td><td>External Motion Generator – Express, controller-based</td></tr> <tr> <td>11</td><td>External Motion Generator – Advanced, controller-based</td></tr> <tr> <td>12</td><td>External Motion Generator – Advanced, for vertical application, controller-based</td></tr> <tr> <td>13</td><td>External Motion Generator – Advanced, with command smoothing, controller-based</td></tr> <tr> <td>14</td><td>External Motion Generator – Advanced, with command smoothing for vertical application, controller-based</td></tr> </tbody> </table> <p>Press: Long Shift</p> <p>Display: Autotuning progress in % number (DP1 is lit)</p> <p>Done: done (or an error code)</p>	0	Internal Motion Generator – Express, drive-based	1	Internal Motion Generator – Advanced, drive-based	2	Internal Motion Generator – Advanced, for vertical applications, drive-based	10	External Motion Generator – Express, controller-based	11	External Motion Generator – Advanced, controller-based	12	External Motion Generator – Advanced, for vertical application, controller-based	13	External Motion Generator – Advanced, with command smoothing, controller-based	14	External Motion Generator – Advanced, with command smoothing for vertical application, controller-based
0	Internal Motion Generator – Express, drive-based																
1	Internal Motion Generator – Advanced, drive-based																
2	Internal Motion Generator – Advanced, for vertical applications, drive-based																
10	External Motion Generator – Express, controller-based																
11	External Motion Generator – Advanced, controller-based																
12	External Motion Generator – Advanced, for vertical application, controller-based																
13	External Motion Generator – Advanced, with command smoothing, controller-based																
14	External Motion Generator – Advanced, with command smoothing for vertical application, controller-based																
Note	<p>During autotuning:</p> <p>A warning will be displayed as S#</p> <p>A fault will be displayed as F# flashing</p>																

Motor Setup

Code	C0001
Command	Motor Setup
VarCom	MOTORSETUP
Sequence	<p>Make sure the drive is disabled, and has no faults</p> <p>Select: C0001</p> <p>Press: Shift</p> <p>Display: nnset</p>  <p>Press: Long Shift</p> <p>Display: Motor setup progress in % number</p> <p>Done: done (or an error code)</p>


Clear Faults OK

Code	C0002
Command	Clear Faults
VarCom	CLEARFAULTS
Sequence	<p>Select: C0002</p> <p>Press: Shift</p> <p>Display: 00000.</p> <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Long Shift</p> <p>Display: 00000. or will continue to show the fault code</p>

Enable / Disable

Code	C0003
Command	Enable/Disable (Toggle)
VarCom	EN / K
Sequence	Select: C0003 Press: Shift Display: 00.000. Press: Long Shift Done: 00.000.
Sequence	Select: C0003 Press: Shift Display: 00.000. Press: Shift Display: Flashing 0. in digit 1 Press: Long Shift Done: 00.000.
Note	The ServoStudio toolbar/status bar might not accurately reflect change in Enable/Disable state. Use the ST command in Terminal to verify.

Jog

Code	C0004
Command	Jog
VarCom	J
Note	Jog speed range: 1 rpm to VLIM The jog command from the panel functions in both 0 and 8 modes
Sequence	Make sure drive is in appropriate operating mode. Make sure drive is Enabled. Select: C0004 Press: Shift Display: jOG 88  Press: Shift Display: 00.000. Press: Shift Display: flashing 0. in digit 1

For example, set a speed of 300 rpm
 First string = values up to 99.999. Nothing to set.



Press: Shift until you reach the first digit in the second string.
 Second string = values up to 9999,9nn.nnn.

Press: Up to reach 3



Press: Long Shift

Display: joG8S (jog motion stopped)




Press and hold Up key move motor at defined speed in positive direction.
 Press and hold Down key to move motor at defined speed in negative direction.

Display: jog8r (rotating, during motion)



Config

Code	C0005
Command	Configure Drive
VarCom	CONFIG
Sequence	<p>Select: C0005</p> <p>Show: cnfg</p>  <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Long Shift</p> <p>Done: done (momentarily), and then 00000. (or an error code)</p>


Save Parameters

Code	C0006
Command	Save Parameters
VarCom	SAVE
Sequence	Select: C0006 Press: Shift Display: done (or an error code)

Encoder Multi-Turn Reset

Code	C0007
Command	Encoder Multi-turn Reset
VarCom	MTTURNRESET
Sequence	Select: C0007 Press: Shift. Display: done (or an error code)


Restore Factory Settings

Code	C0008
Command	Restore Factory Settings
VarCom	FACTORYRESTORE
Sequence	Make sure drive is Disabled. Select: C0008 Display: frstr  Press: Shift Display: Flashing 0. in digit 1 Press: Up (>1) for digits 1 to 4 Display: 0 1 1 1 1. Press: Long Shift Display: done (momentarily), then flashes, and stops.


Analog Input 1 Zero

Code	C0009
Command	Analog Input 1 Zero Command
VarCom	ANIN1ZERO
Sequence	<p>Make sure drive is Disabled.</p> <p>Select: C0008</p> <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Long Shift</p> <p>Display: done</p> <p>(or an error code)</p>


Move Absolute - Distance

Code	C0010
Command	Move Absolute - distance
VarCom	<p>MOVEABS {distance} {velocity}</p> <p>Sets the distance argument. Command uses velocity value set by JOGSPD1.</p>
Sequence	<p>Make sure drive is Enabled.</p> <p>Select: C0010</p> <p>Display: absnn</p>  <p>Press: Long Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: (for example) Set a value of 15 (revolutions)</p> <p>Press: Long Shift</p> <p>(motor rotates)</p> <p>Display: abSnn (during motor movement)</p> <p>Display: done</p> <p>(or an error code)</p>


Move Incremental - Distance

Code	C0011
Command	Move Incremental - distance
VarCom	MOVEINC {distance} {velocity} Sets the distance argument. Command uses velocity value set by JOGSPD1.
Sequence	<p>Select: C0011</p> <p>Display: incnn</p>  <p>Press: Long Shift</p> <p>Display: flashing 0</p> <p>Press: (for example) Set a value of 2 (revolutions)</p> <p>Press: Long Shift</p> <p>Display: incnn (during movement)</p> <p>Display: done (or an error code)</p> <p>Note value of movement = revolution, counts, degrees Sets distance for movement. Speed is set according JOGSPD1</p>


Home

Code	C0012
Command	Home
VarCom	HOMECMD
Sequence	<p>Select: C0012</p> <p>Display: honne</p>  <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Set the value of a homing type</p> <p>Press: Long Shift</p> <p>Press: Long Shift</p> <p>Display: (indicates homing progress in a % number)</p> <p>Display: done (or an error code)</p>

Phase Find

Code	C0013
Command	Phase Find
VarCom	PHASEFIND
Sequence	<p>Select: C0013</p> <p>Press: Shift.</p> <p>Display: PhaSe</p>  <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Long Shift</p> <p>Display: done</p> <p>(or an error code)</p>

Sine/Cosine Calibration

Code	C0014
Command	Sine/Cosine Calibration
VarCom	SININIT
Sequence	<p>Select: C0014</p> <p>Display: sinin</p>  <p>Press: Shift</p> <p>Display: Flashing 0. in digit 1</p> <p>Press: Long Shift</p> <p>Display: done</p> <p>(or an error code)</p>

4 Operator Panel – Monitoring Mode

The Monitoring mode is indicated by the character **d** in digit 5.

In Monitoring mode, the panel is used to read drive variables, such as speed, position, and current, inputs and outputs.



HMI Monitor Codes

Table 4-1. Monitor Codes

Command - VarCom	Description	Code
V	Actual speed, in rpm	d0000
PFB	Actual position, in degrees	d0001
PFB	Actual position, in revolutions	d0002
I	Current, in amperes	d0003
IN	Digital inputs 1 through 10	d0004
IN	Digital input 11	d0005
OUT	Digital outputs 1 through 7	d0006
Not Applicable	CAN statusword	d0007
Not Applicable	CAN controlword	d0008
ANIN1	Analog input 1	d0009
ANIN2	Analog input 2	d0010
HWPEXT	Hardware position-external	d0011

Actual Speed

Code	d0000
Command	Velocity
Description	Shows the actual speed of the motor, as measured by the primary feedback, in rpm. Speed is shown in digits 4 3 2 1 If motion is in a negative direction, DP5 is lit.
VarCom	V
Sequence	Select: d0000 Press: Shift Display: 00000 Press: Shift (repeatedly), until only DP1 is lit. Start motion.
Examples	0 0 2 5 0. = positive motion 250 rpm 0 0 0 2 0. = positive motion 20 rpm 0.0 2 5 0. = negative motion 250 rpm 0.0 0 2 0. = negative motion 20 rpm

Actual Position (degrees)

Code	d0001
Command	Actual Position, in degrees
Description	Shows the actual position of the motor, as measured by the primary feedback, in degrees. If the position is a negative value, DP5 is lit.
VarCom	PFB
Sequence	Select: d0001 Press: Shift (repeatedly) until only DP2 and DP1 are lit. Start motion. Press the Shift key to view the next string.
Examples	Examples of display: 0025.0. during motion 0036.0. (move absolute 36,000 degrees position: 100 revs.) 0360.0. (move absolute 360,000 degrees position: 1000 revs.) 1800.0. (move absolute 1,080,000 degrees position: 3000 revs.) 0.003.6. (move absolute -3,600 degree position: -10)





Actual Position (rev)

Code	d0002
Command	Actual Position, in revolutions
Description	Shows the actual position of the motor, as measured by the primary feedback, in revolutions. If the position is a negative value, DP5 is lit.
VarCom	PFB
Sequence	Select: d0002 Press: Shift Start motion.
	<p>If number of revolutions = 1000 – 9999: digits 4 3 2 1 = integer value</p> <p>If number of revolutions <1000: digits 4 3 2 = integer value, digit 1 = decimal value DP1 is lit</p> <p>If number of revolutions <100 digits 4 3 = integer value digits 2 1 = decimal value DP2 and DP1 are lit</p> <p>If number of revolutions <10 digit 4 = integer value digit 3 2 1 = decimal value DP3, DP2 and DP1 are lit</p> <p>If number of revolutions > 10,000, press Shift to view the next string.</p>
Examples	<p>Examples of display:</p> <p>If position = 00.000 to 99.999: String 1: 78.123. 78.123 revolutions 97.345 97.345 revolutions</p> <p>If position = 100.000 to 999.999: String 1: 01.789. = 101.789 revolutions 04.367. = 104.367 revolutions</p> <p>Press Shift String 2: 0000.1. = 101.789 0000.1. = 104.367</p>



Actual Current

Code	d0003
Command	Motor Current
Description	Shows the motor current, in amperes. If the current is a negative value, DP5 is lit.
VarCom	I
Sequence	Select: d0003 Press: Shift Display: 0 0 . # # # .
Examples	During motion, values change continuously. 00.178. 00.188. 00.192. 00.204.



Digital Inputs 1 through 10

Code	d0004
Command	Digital Inputs State
Description	Indicates the state of digital inputs 1 through 10. Double height line = on Single height line = off Read from left to right.
VarCom	IN
Sequence	Select: d0004 Press: Shift
Examples	<p>Digital input 1 on. Digital inputs 2 through 10 off.</p>  <p>Digital input 2 on. Digital inputs 1, 3 through 10 off.</p>  <p>Digital 1 through 10 are all on.</p>  <p>Digital inputs 1 through 10 are all off.</p> 

Digital Input 11

Code	d0005
Command	Digital Input 11 Status
Description	Indicates the state of digital input 11. Double height line = on Single height line = off
VarCom	IN
Sequence	Press: d0005 Press: Shift
Examples	<p>Digital input 11 is on.</p>  <p>Digital input 11 is off.</p> 

Digital Outputs 1 through 7

Code	d0006
Command	Digital Outputs State
Description	Indicates the state of digital outputs 1 through 7. Double height line = on Single height line = off Read from left to right.
VarCom	OUT
Sequence	Press: d0006 Press: Shift
Examples	<p>Digital outputs 1 through 7 are all on.</p>  <p>Digital outputs 1 through 7 are all off.</p> 

Returns CAN Statusword

Code	d0007
Command	Returns Statusword
Description	Object 6041h
VarCom	Not Applicable
Sequence	Press: d0007 Press: Shift Display: h4250 (for example)

Returns CAN Controlword

Code	d0008
Command	Returns Controlword
Description	Object 6040h
VarCom	Not Applicable
Sequence	Press: d0008 Press: Shift Display: h0000 (for example)

Analog Input 1 Value

Code	d0009
Command	Analog Input 1 Value
Description	Shows the value of analog input 1, in millivolts
VarCom	ANIN1
Sequence	Press: d0009 Press: Shift Display: 02.286. (for example)

Analog Input 2 Value

Code	d0010
Command	Analog Input 2 Value
Description	Shows the value of analog input 2, in millivolts
VarCom	ANIN2
Sequence	Press: d0010 Press: Shift

Hardware Position External (counts)

Code	d0011
Command	Hardware Position External
Description	Shows the position as measured by an external feedback device, in counts
VarCom	HWPEXT
Sequence	Press: d0011 Press: Shift Display: 00032. (for example)
Examples	-16 counts 0.0016.

5 Operator Panel – Faults & Info Mode

The Faults & Info mode is indicated by the character **F** in digit 5.

HMI Fault Codes

If one or more faults occurs while the digital display is in Status, Commands or Monitoring mode, the Faults mode “hijacks” the display, and the code of the most recent fault is displayed.



When faults occur simultaneously, the display shows the code of the fault with the highest priority.

To resume work, after clearing the fault/s, you must select a different display mode.

When the digital display is in Fault mode, the fault codes are displayed as a string, in digits 4, 3, 2 and 1 as needed, and do not flash.

If a fault remains in effect, and a different display mode is selected, the fault code characters will be displayed sequentially in digit 4, with flashing.

For the full list of Fault codes, refer to *Digital Display – Fault Codes* in the CDHD2 User Manual.

HMI Info Codes

The Faults & Info mode is also used to display faults history, warning history, and drive information.

Info codes are shown in the table below.

The sequences for entering codes and viewing information are presented in the sections that follow.




Table 5-1. Info Codes

Command - VarCom	Description	Code
FLTHIST	Faults History	F0001
VER	Firmware Version	F0002
VER	FPGA Version	F0003
Not Applicable	Warnings History	F0004





Faults History

Code	F0001
Command	Faults History
VarCom	FLTHIST
Example	Fe123 : TP Read Failure Fr20 : Feedback Communication Error Fe : Parameter Memory Checksum Failure Fr25 : Pulse and Direction Input Line Break
Sequence	Select: F0001 Press: Shift Display: Fr123 Press: Up Display: Fr2 Press: Up Display: Fe
Note	Since the same fault may have been triggered multiple times, you may need to press the Up or Down key a number of times before the code changes. Alternately, press and hold the Up or Down key. The longer you press the key, the faster the scrolling.

Firmware Version

Code	F0002
Command	Firmware Version
VarCom	VER
Example	Firmware version: 2.0.0a0.0.48
Sequence	Select: F0002 Press: Shift Display:  Press: Shift Display:  Press: Shift Display:  Press: Shift Display: 00000 Press: Shift (display returns to 2.0.0.0)

FPGA Version

Code	F0002
Command	Firmware Version
VarCom	VER
Example	FPGA Version: 4.08 March 16 2017
Sequence	<div>Select: F0002</div> <div>Press: Shift</div> <div>Display:</div> <div></div> <div>Press: Shift</div> <div>Display:</div> <div></div> <div>Press: Shift</div> <div>Display:</div> <div></div> <div>Press: Shift</div> <div>Display:</div> <div></div>

Warnings History

Code	F0004
Command	Warnings History
VarCom	Not Applicable
Example	F : Foldback Warning n : STO Warning L6 : Software Limit Switches are Tripped
Sequence	Select: F0001 Press: Shift Display: F Press: Up Display: n Press: Up Display: L6
Notes	<p>When displayed in Status mode, multi-character warning codes are displayed in sequence, in digit 4 only. When displayed in Faults & Info mode, multi-character codes are displayed as strings.</p> <p>Since the same warning may have been triggered multiple times, you may need to press the Up or Down key a number of times before the code changes. Alternately, press and hold the Up or Down key. The longer you press the key, the faster the scrolling.</p>



CDHD2 Servo Drive – Operator Panel (HMI)



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