HydraForce
POWER FORWARD

ELECTRONICS PRODUCT GUIDE

EASY
POWERFUL
ROBUST

A rugged line of electronic valve drivers, control units, operator interfaces, and sensors designed specifically for the demanding mobile hydraulic equipment markets.

www.hydraforce.com

ExDR Proportional Valve Drivers are preconfigured for convenient application on general purpose (input/output scaling), generator (closed-loop PID control), or transmission/clutch (time-based) controls.

HF-Impulse™ software is used to set parameters for ExDR drivers, monitor output or function as a service tool, or to develop applications with ECDR configurable drivers.

EVDR-0101A, General Purpose Electronic Valve Driver, Part No. 4204800

The EVDR-0101A is a general purpose valve driver. It can accept input from analog or digital operator interface devices. The output follows a user-defined metering profile with up to three breakpoints and independent input/output ramps. The driver has one 2 amp, 40-400 Hz, PWM sourcing output. An LED indicator on the front provides quick status check and fault detection. It uses *HF-Impulse* configuration software.

Development cables: P/N 4000285, 4000286

ETDR-0101A, Time-Based Transmission Valve Driver, Part No. 4204810

The ETDR-0101A is a time-based valve driver that allows time-based shaping of the output for transmission/clutch control, soft start, hotshot or other applications. The digital input triggers the output sequence. You can define six output levels and their duration. as well as the ramp down rate. The driver has one 2 amp, 40-400 Hz, PWM sourcing output. It uses *HF-Impulse* configuration software.

Development cables: P/N 4000285, 4000286

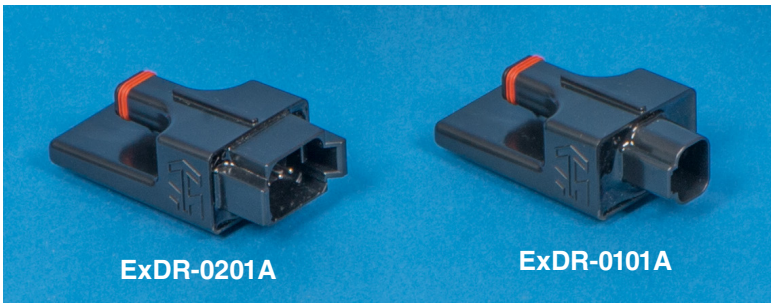
EGDR-0101A, Generator Control Valve Driver, Part No. 4204850

The EGDR-0101A is a closed-loop PID control that drives output to a user-defined setpoint, such as in a generator speed control. The input provides feedback to the control loop and is compatible with many analog and digital inputs such as speed pickups and frequency detectors like the HydraForce EACD-1. Using *HF-Impulse* software for configuration, the user defines a timing profile for startup, PID terms, and setpoint, as well as advanced control features like integral limits and windup guard. The driver has one 2 amp, 40-400 Hz, PWM sourcing output.

Development cables: P/N 4000285, 4000286

EACD-1, AC Frequency Detector, Part No. 4208010

The EACD-1 is is an optically isolated AC frequency detector intended for use as a feedback in hydraulic motor-driven AC power generator applications. The output of the EACD-1 provides a pulse signal based on the generator output frequency to directly drive the input pin of the speed control.



ExDR-0101A Input/Output Table						
Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse (PWM/freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
1					X	X
1	X	X	X	X		
2	1	1	1	1	1	1

EVDR-0201A, CAN Capable General Purpose Electronic Valve Driver, Part No. 4204700

The EVDR-0201A has two ouputs and one analog or digital input. You can also use this driver with SAE J1939 operator interface devices. As the input changes, the output follows a defined metering profile: either straight-line or dual-sloped output. The EVDR-0201A uses *HF-Impulse* configuration software and has LED indicators for quick status check and fault detection.

Development cables: P/N 4000304, 4000371

EFDR-0201A, CAN Capable Fan Control Electronic Valve Driver, Part No. 4204710

The EFDR-0201A is designed especially for proportional reversing fan drive control applications. You can scale fan speed to match input from a temperature sensor or respond to CAN messages from the engine control module. The control can reverse fan direction by user input or by CAN message. It uses *HF-Impulse* configuration software.

Development cables: P/N 4000304, 4000371

ExDR-0201A Input/Output Table						
Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse (PWM/freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
2					X	X
1	X	X	X	X		
3	1	1	1	1	2	2

HF-Impulse™ *Software*

HF-Impulse is an easy to use setup/configuration platform for the ExDR valve drivers, the ECU-0809 and ECBP CAN button panels. The software allows you to flash devices with the latest firmware, change their "personality" and configure all parameters for operation. You can even monitor operation of the devices for performance testing and troubleshooting. Once the configuration parameters are set, simply upload to the device.

You can download *HF-Impulse* software free of charge on the HydraForce Electronics Portal at www.hydraforce.com/electronics.

ExDR Electronic Valve Drivers

ECDR Configurable Valve Drivers are fully configurable to any hydraulic control application. Using *HF-Impulse*™ software, you can develop simple or complex control logic without writing code.

HF-Impulse software lets you build control schemes using modular function blocks in a drag-and-drop configuration environment. Macro blocks allow you to create reusable function libraries while simplifying the logic diagram. With CAN 2.0B networking, ECDR valve drivers can interface with other controllers in a distributed control architecture. The larger ECDR-0506A can control other CAN devices, such as the ECDR-0201A, to expand control options as needed.

ECDR-0101A, Configurable Electronic Single Valve Driver, Part No. 4204820

The ECDR-0101A is a configurable valve driver with one input and one output. You can use it with analog or digial input devices. It has the same amount of I/O as an EVDR-0101A but can be flexible in functionality. Two LED indicators provide quick status check and fault detection.

Development cables: P/N 4000304, 4000371

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse(PWM/ freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
1					X	X
1	X	X	X	X		
2	1	1	1	1	1	1

ECDR-0201A, Configurable Electronic Dual Valve Driver, CAN Capable, Part No. 4204740

The ECDR-0201A is a configurable valve driver with one input and two outputs. You can use it with analog, CANopen or SAE J1939 operator interface devices. It has the same amount of I/O as an EVDR-0201A but can be flexible in functionality. Two LED indicators provide quick status check and fault detection.

Development cables: P/N 4000304, 4000371

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse(PWM/ freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
2					X	X
1	X	X	X	X		
3	1	1	1	1	2	2

ECDR-0203A, Configurable Electronic Valve Driver, CAN Capable, Part No. 4208230

The EVDR-0203A is a configurable valve driver with two outputs and three inputs that can be accepted from analog, CANopen or SAE J1939 operator interface devices. It has one LED indicator light for quick status check and fault detection.

Development cables: P/N 4000307, 4000371

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse(PWM/ freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
2					X	X
3	X	X	X	X		
5	3	3	3	3	2	2

ECDR-0506A, Configurable Electronic Valve Driver, CAN Capable, Part No. 4208560

The ECDR-0506A is a configurable valve driver with five PWM outputs, including four closed loop outputs and one open loop output. There are six configurable inputs. Communication capabilities include CANopen and SAE J1939. It has one LED indicator light for quick status check and fault detection.

Development cables: P/N 4000307, 4000308, 4000371

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse(PWM/ freq)	Analog V/I/R	PWM (Source)	Digital Out (Source)
5					X	X
6	X	X	X	X		
11	6	6	6	6	5	5

Download the software at the HydraForce Electronics Portal at https://www.hydraforce.com/Electronics

HydraForce Electronic Control Units

For more sophisticated controls, these general purpose ECUs (Electronic Control Units) can function as stand-alone controllers or be used for integration into a CAN network with other devices. They feature flexible input and output configuration.

HydraForce ECUs are programmed using CoDeSys™ programming software. The ECU-0809 can also be programmed with *HF-Impulse*™ using drag-and-drop function blocks. Both software programs are available for free download from the HydraForce Electronics Portal.

ECU-0809, Part No. 4000350 and ECU-0809A, Part No. 4002722

The ECU-0809 is a fully programmable control unit featuring 21 flexible I/O pins. Up to 8 PWM outputs, and 9 configurable inputs of analog, digital or frequency (see table). It features a 100 MHz 16/32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols. The ECU-0809 has one CAN 2.0B port, the A version has two.

ECU-0809 programmed with CoDeSys or *HF-Impulse*.

ECU-0809A programmed with CoDeSys.

Development cables: P/N 4000306, 4000371

ECU-0809(A) Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM	Digital Out
8	X					X (Source)	X (Source)
5		X	X				
4		X		X			
4					X		
21	8	9	5	4	4	8	8

ECU-0814A, Part No. 4002724

The ECU-0814A is a fully programmable control unit featuring 22 flexible I/O pins. Up to 8 PWM outputs, and 14 configurable inputs of analog, digital or frequency (see table). It features a 100 MHz 16/32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols through two CAN 2.0B ports.

Programmed with CoDeSys.

Development cable: P/N 4000371

ECU-0814A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM	Digital Out
6	X				X	X (Source)	X (Source)
3		X		X			
5		X		X			
2		X				X (Sink)	X (Sink)
4		X	X				
2	X	X	X				
22	6	11	6	8	6	8	8

ECU-2415A, Part No. 4002723

The ECU-2415A is a fully programmable control unit featuring 49 flexible I/O pins. Up to 24 PWM outputs, and 15 configurable inputs of analog, digital or frequency (see table). It features a 100 MHz 16/32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols through two CAN 2.0B ports.

Programmed with CoDeSys.

Development cable: P/N 4000371

ECU-2415A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM (Source)	Digital Out (Source)
1	X						
10					X		
6		X		X			
8	X		X				
8		X				X	X
16	X					X	X
49	25	14	8	6	10	24	24

ECU-2820A, Part No. 4000383

The ECU-820A is a fully programmable control unit featuring 52 flexible I/O pins. Up to 28 PWM outputs, and 20 configurable inputs of analog, digital or frequency (see table). It features a 100 MHz 16/32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols through two CAN 2.0B ports.

Programmed with CoDeSys.

Development cable: P/N 4000371

ECU-2820A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM (Source)	Digital Out
4		X					
4					X		
24		X				X	X (Source)
8		X		X			
4		X					X (Sink)
8		X	X				
52	0	48	8	8	4	24	24

ECU-2434A, Part No. 4002712

The ECU-2434A is a fully programmable control unit featuring 68 flexible I/O pins. Up to 24 PWM outputs, and 34 configurable inputs of analog, digital or frequency (see table). It features a 100 MHz 16/32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols through two CAN 2.0B ports.

Programming is done with CoDeSys™ software.

Development cable: P/N 4000371

ECU-2434A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pul-seInput	Analog Input	Current Feedback	PWM	Digital Out
16	X					X (Source)	X (Source)
4		X				X (Source)	X (Source)
4		X					X (Sink)
2		X		X			
14		X		X			
4				X			
10					X		
12	X	X	X				
1	X	X	X				
1	X	X	X				
68	34	38	14	20	10	20	24

ECU-3233A, Part No. 4000343

The ECU-3233A is a fully programmable control unit featuring 68 flexible I/O pins. Up to 32 PWM outputs, and 33 configurable inputs of analog, digital or frequency (see table). It features a 128 MHz 32 bit processor, and has the ability to communicate using both CAN Open and SAE J1939 communication protocols through four CAN 2.0B ports.

Programming is done with CoDeSys software.

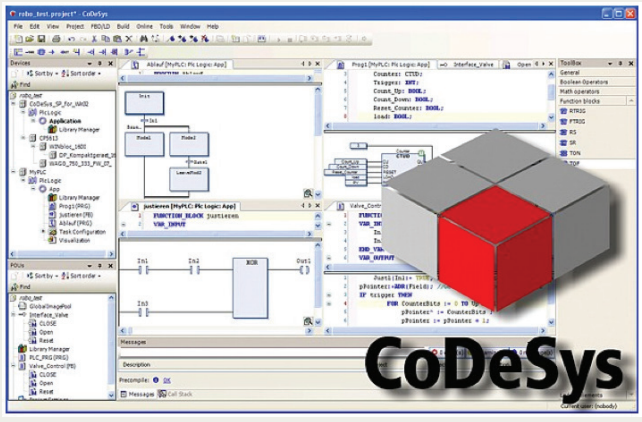
Development cable: P/N 4000371

ECU-3233A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pul-seInput	Analog Input	Current Feedback	PWM	Digital Out
12		X			X	X (Source)	X (Source)
8		X			X	X (Source)	X (Source)
4		X				X (Source)	X (Source)
4		X				X (Source)	X (Source)
4		X					X (Sink)
11	X	X		X			
4		X	X				
14	X	X	X				
4		X	X				
65	25	65	22	11	20	28	32

CoDeSys™ Configuration Software

CoDeSys or Controlled Development System is a complete development environment for PLCs. CoDeSys puts the powerful IEC language into your hands, enabling a simple approach to application development. The editors and debugging functions are based on the proven development program environments of advanced programming languages.



HydraForce CoDeSys Features

You can download CoDeSys free of charge through the HydraForce Electronics Portal at www.hydraforce.com/electronics.

HydraForce ECU controllers use an HF created template file to begin program creation.

- HydraForce ECU-Backbone is an all-in one I/O pin and CAN communication configuration tool. It allows you to configure modules, such as I/O pin assignment and CAN (SAE J1939, CANopen definitions prior to programming the device in the CoDeSys editor. This tool is also used to create the service tool.
- There is no cost to you to use CoDeSys with HydraForce ECUs.

Operator Controls/Switches and Sensors

Our ECBP Electronic CAN Button Panels can be custom-configured with four to eight independently controlled LED illuminated switches. Interchangeable cams allow 1, 2 or 3 positions and detented or momentary action.

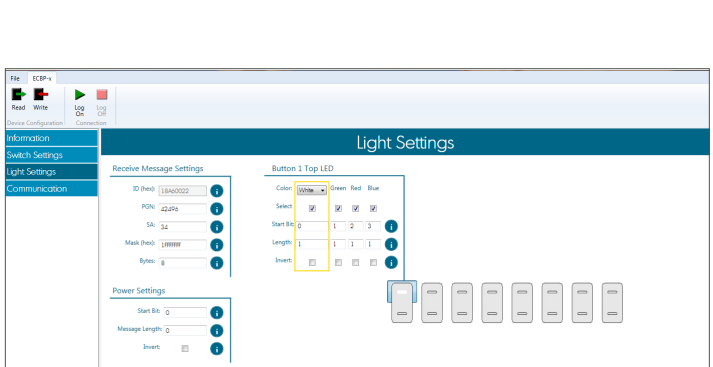
The cams are designed on a simple snap-in platform that allows for easy and economical assembly and modification. You can configure the LEDs in up to 8 colors to indicate system status, with optional laser-etched icons.

This panel is rugged enough for use on mobile hydraulic equipment applications - it has an environmental rating of IP68, and has passed thermal, shock and salt spray testing.

This easy-to-use panel can be configured with *HF-Impulse*™ software.

8-Button CAN Button Panel

Part Number	Model Description
Part No. 4000384	ECBP-4, 4-Button CAN Switch Panel
Part No. 4000385	ECBP-5, 5-Button CAN Switch Panel
Part No. 4000386	ECBP-6, 6-Button CAN Switch Panel
Part No. 4000387	ECBP-7, 7-Button CAN Switch Panel
Part No. 4000388	ECBP-8, 8-Button CAN Switch Panel



***HF-Impulse* configuration screen for ECBP CAN Button Panel**

Sensors

ERT Temperature Sensor, Part No. 4206200

This cost-effective and reliable thermistor style heavy-duty analog temperature sensor has a padded resistor for improved linearity of the input curve.

ERP Pressure Sensor

This high-accuracy, heavy-duty series of pressure sensors offer 1% total error band accuracy accomplished by combining a high performance ASIC with a stable, field-proven, polysilicon, thin-film pressure sensor. These sensors are designed especially for use in demanding mobile equipment applications.

5 Vdc Power Supply		9 to 36 Vdc Power Supply	
34 bar/500 psi	**Part No. 4000650**	34 bar/500 psi	**Part No. 4000655**
103 bar/1500 psi	**Part No. 4000651**	103 bar/1500 psi	**Part No. 4000656**
207 bar/3000 psi	**Part No. 4000652**	207 bar/3000 psi	**Part No. 4000657**
345 bar/5000 psi	**Part No. 4000653**	345 bar/5000 psi	**Part No. 4000658**
414 bar/6000 psi	**Part No. 4000654**	414 bar/6000 psi	**Part No. 4000659**

EACD-1, AC Frequency Detector, Part No. 4208010

The EACD-1 is is an optically isolated AC frequency detector intended for use as a feedback in hydraulic motor-driven AC power generator applications. The output of the EACD-1 provides a pulse signal based on the generator output frequency to directly drive the input pin of the speed control. This unit is especially designed for use with the EGDR-0101A Electronic Generator Driver.

Operator Controls/Displays

Through a systems integration partnership with Topcon, HydraForce offers several operator displays to its lineup of electronic products. These rugged programmable display units are specifically designed for use with hydraulically powered mobile equipment. They offer the operator convenient and state-of-the-art control of machine functions.

The display units are easy to program, using Java-based programming tool that allows any user to create customized screens, assign program button actions and configure CANbus messages.

A3 is a 109 mm (4.3 in) color display with 8 programmable soft keys and 3 hard keys. The A6 is a larger, 177 mm (7 in) color display with 12 programmable soft keys and three hard keys, a fast processor, audio-out interface and three video inputs.

RATINGS

Display: Sunshine-readable thin film transistor color graphic LCD. Light gray plastic housing with black rubber frame; glass front with anti-reflective foil surface.

Encoder: Electromechanical with mechanical detents and push mechanism rated for 1-million activations without electronic failure.

Processor: 32-bit, 532 MHz, I.MX35.

Memory: 128/256 MB DDR2; 512 MB / 1 GB Mass Storage; 32 kB serial EEPROM.

Operating System: Embedded Linux.

Programming: Topcon Projektor-Tool for Windows 7, 8, 10 supporting CANopen, generic driver, CANfreestyle, J1939.

Interfaces: Two CANbus ISO 11898, CAN specification 2.0 B active. One RS-232 (RxD, TxD, GND only), EIA-level. (Model A3S-Full only) 4 analog or digital inputs (selectable via software) 3 digital outputs, 1 USB 2.0 full speed on main connector, 1 USB 2.0 high speed on front, Ethernet 10/100 Mbit.

Connectors: Main connector: Tyco-AMP Super Seal, 26-pin. USB on main connector. (Model A3S-Full only) USB A on front panel; Ethernet: 4-pole round connector, M12, D-coded. Video: 5-pole round connector, M12, B-coded.

Power Supply: Designed for 12 V and 24 V battery system.

Operating voltage range: 8 to 36 Vdc.

Overvoltage resistance: 48 V for 2 minutes. Inverse polarity protection up to -48 Vdc.

Environmental: Operating Temperature: -30 to 65 °C (-22 to 149 °F). Storage Temperature: -40 to 85 °C (-40 to 185 °F). Protection: IP67 and IP65 (true outdoor).

Vibration: 5 G @ 57 to 2000 Hz, 150 h per axis.

Shock: 30 G, 11ms, 10x per axis.

Certification: e1 and CE; ISO 15003; ISO 16740-4 Climatic Loads C.

Features by Model	A3S - Full	A3S - Basic	A6S - Full	A6S - Basic
Part Number	4000401	4000400	4000408	4000407
Display Size	109 mm (4.3 in)	109 mm (4.3 in)	177 mm (7 in)	177 mm (7 in)
Resolution	480 x 262 pixel	480 x 262 pixel	800 x 480 pixel	800 x 480 pixel
Backlit Keys	8 soft, 3 hard	8 soft, 3 hard	12 soft, 3 hard	12 soft, 3 hard
Touchscreen	Yes	No	Yes	No
USB Port	Front Panel	Rear Connection	Front Panel	Rear Connection
Inputs	4 analog / digital	none	4 analog / digital	none
Outputs	3 digital	none	3 digital	none
Video Inputs	1	none	3	none
CANbus ISO 11898	2	2	2	2
Audio - Out Interface	No	No	Yes	No
Processor Speed	532 MHz	532 MHz	532 MHz	532 MHz
RAM (DDR2)	256 MB	128 MB	128 MB	128 MB
Mass Storage (Flash Memory)	1GB	512MB	1GB	512MB

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INNOVATION AND TECHNOLOGY CENTER

IN VERNON HILLS, ILLINOIS

EUROPEAN HEADQUARTERS

ENGINEERING AND MANUFACTURING FACILITY IN BIRMINGHAM, ENGLAND

ASIAN/PACIFIC HEADQUARTERS

PRECISION MACHININGAND MANIFOLD ASSEMBLY FACILITY IN CHANGZHOU, CHINA, NEAR SHANGHAI

SOUTH AMERICAN

MANIFOLD ASSEMBLY FACILITY NEAR SÃO PAULO, BRAZIL

RoHS COMPLIANT HydraForce valve and manifold products comply with the European Council and Parliament RoHS directive 2002/95/EC limiting the use of hazardous substances. For all other products, consult factory.

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