HydraForce
POWER FORWARD®

ELECTRONICS
PRODUCT GUIDE

HydraForce
POWER FORWARD®

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 Family of Electronic Valve Drivers

ExDR Proportional Valve Drivers come in several preconfigured control personalities designed to perform specific tasks. They area available with a variety of I/O configurations including 1/1, 1/2, 3/2, and 6/5.
Personalities include:

- EVDR – Electronic Valve DRiver: Basic input/output scaling with one input and one or two outputs
- ETDR – Electronic Time-based DRiver: Time-based output scaling useful for applications such as hotshot, soft start, and transmission clutch control
- EGDR – Electronic Generator DRiver: Closed-loop control for generator and other applications
- ESDR – Electronic Servovalve DRiver: Closed-loop control for use with HydraForce LVDT position-sensing servovalve.
- EFDR – specifically designed for reversing fan drive control
- ECDR – completely configurable drivers you can program without writing a single line of code.

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

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

A compact, plug-in style, microprocessor-based valve driver designed for use in hydraulic proportional valve applications. The EVDR-0101A drives a single coil to a user-defined metering profile using an independent signal. The profile provides either a straight-line or multi-sloped output that you configure with HF-Impulse: an easy-to-use software tool available as a free download at www.hydraforce.com/electronics. An output LED indicator is located on the front.

Development cables: P/N 4000285, 4000286

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

A compact plug-in style, microprocessor based, valve driver designed for use in hydraulic proportional valve applications. Configurable to drive either one or two coils using SAE J1939 CAN input or an independent signal. The EVDR-0201A proportionally controls one or two coils to a user-defined metering profile. The profile provides either a straight-line or multi-sloped output that you configure with HF-Impulse software: an easy to use, web-accessible configuration tool available as a free download at www.hydraforce.com/electronics. Two output LEDs are located on the front.

Development cables: P/N 4000304, 4000371

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

A compact plug-in style, microprocessor-based valve driver designed for use in hydraulic proportional valve applications for clutch engagement, "hot shot" coil saver and soft start motor applications. It can also operate in timer-based applications (no input or input only to start a timer). The ETDR-0101A drives a single coil to a user-defined timing profile using a digital trigger. The profile provides a stepped output which you configure with HF-Impulse: an easy-to-use software tool available as a free download at www.hydraforce.com/electronics. An LED output indicator is located on the front.

Development cables: P/N 4000285, 4000286

EGDR-0101A, Closed-Loop (Generator) Valve Driver Part No. 4204850

A compact, plug-in style, microprocessor-based valve driver designed for use in hydraulic proportional valve applications. The EGDR-0101A drives a single coil in closed loop control using an independent signal. The control provides a timed ramp on startup and PID closed loop settings that you configure with HF-Impulse: an easy-to-use software tool available as a free download at www.hydraforce.com/electronics. An LED output indicator is located on the front.

Use with EACD-1: AC frequency detector P/N 4208010

Development cables: P/N 4000285, 4000286

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

A compact plug-in style, microprocessor based valve driver designed for use on hydraulic proportional valves for fan drive applications. Configurable to drive two coils using SAE J1939 CAN input or an independent signal. The EFDR-0201A proportionally controls one coil to a user-defined metering profile and provides reverse sequence control with the second coil providing fan direction. The profile provides either a straight-line or multi-sloped output that you configure with HF-Impulse software: an easy to use, configuration tool available as a free download at www.hydraforce.com/electronics. Two output LEDs are located on the front.

Development cables: P/N 4000304, 4000371

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

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

ExDR Family of Electronic Valve Drivers

NEW

ESDR-0201A, Closed-Loop Servovalve Driver
Part No. 4213200

A compact, plug-in style, microprocessor-based valve driver designed for use in hydraulic proportional valve applications. The ESDR-0201A drives a dual-coil proportional valve equipped with a linear variable displacement transformer (LVDT) configured as a position sensor. The control accepts a 0 to 5 V input signal from the LVDT and provides PID control to a setpoint received via CAN message from the main control unit. PID closed loop settings are available for tuning along with parameters for CAN communications including features such as error messaging. All configuration is accomplished using HF-Impulse: an easy-to-use software tool available as a free download at www.hydraforce.com/electronics. Two LED output indicators are located on the front.

Use with LVDT coil assembly: P/N 4213360

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

A compact plug-in style, microprocessor based valve driver designed for use in hydraulic proportional valve applications. Configurable to drive a single coil using an independent signal. The ECDR-0101A proportionally controls one coil to a user-defined metering profile. It is configured with HF-Impulse: an easy-to-use, web-accessible configuration tool available as a free download at www.hydraforce.com/electronics. An LED output indicator is located on the front.

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

Development cables: P/N 4000304, 4000371

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

A compact plug-in style, microprocessor based valve driver designed for use in hydraulic proportional valve applications. Configurable to drive either one or two coils using SAE J1939 CAN or CAN Open input or an independent signal. The ECDR-0201A proportionally controls one or two coils to a user-defined metering profile. It is configured with HF-Impulse software; an easy-to-use, web-accessible configuration tool available as a free download at www.hydraforce.com/electronics.

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

Development cables: P/N 4000304, 4000371

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.

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

Development cables: P/N 4000307, 4000371

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.

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

Development cables: P/N 4000307, 4000308, 4000371

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.

NEW

ECU-0408A, Part No. 4002815

The ECU-0408A is a fully programmable control unit featuring 15 flexible I/O pins: 4 PWM outputs and up to 11 configurable inputs of analog, digital or frequency (see table). All outputs are capable of driving up to 3 amps, and 3 one amp current feedbacks are available for closed-loop operation. It features a 100 MHz 16/32 bit processor, and has the ability to communicate using CAN Open communication protocol.

ECU-0408 is programmed with CoDeSys 2.3

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). All outputs are capable of driving up to 2 amps (closed loop) or 3 amps (open loop). 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 is programmed with CoDeSys 2.3 or HF-Impulse.

ECU-0809A programmed with CoDeSys 2.3.

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 2.3.

NEW

ECU-1616A (full), Part No. 4002859
ECU-1616B (basic), Part No. 4002860

The ECU-1616 is a compact programmable control unit. It has a powerful 32-bit processor and large internal memory for application and parameters. It has 16 inputs and 16 outputs with high-side current measurement (basic version has 12 with CM/4 without CM), two CAN buses and a status LED. ECU-1616 uses CODESYS 3.5 programming and supports HydraForce PLC libraries, MultiTool, and Epec CANmoon tools. ECU-1616A Control Unit has a robust painted aluminum housing (basic version is unpainted), IP69 rated, and has a lever-locking connector designed especially for high vibration environments.

Programmed with CoDeSys 3.5.

ECU-0408A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM	Digital Out
4	X					X (Source)	X (Source)
4		X	X				
1	X		X				
3		X		X			
3					X		
15	5	7	4	3	3	4	4

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 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-1616A Input/Output Table

Max. I/O Count	Digital In (pull down)	Pulse Input	Analog Input	Current Feedback	PWM (Source)	Digital Out (Source)
16				X	X	X
10	X		X			
6	X	X	X			
32	16	6	16	16	16	16

ECU-1616B Input/Output Table

Max. I/O Count	Digital In (pull down)	Pulse Input	Analog Input	Current Feedback	PWM (Source)	Digital Out (Source)
12					X	X
4					X	X
10	X		X			
6	X	X	X			
32	16	6	16	16	16	16

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 2.3.

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.

Programmed with CoDeSys 2.3.

ECU-2820A, Part No. 4000383

The ECU-2820A 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 2.3.

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.

Programmed with CoDeSys 2.3.

NEW

ECU-3435S, Part No. 4002858

The hydraforce ECU-3435S slave unit is designed for various control system applications in a distributed master/slave architecture. The unit provides plenty of I/O in a compact housing, leavyseal connectors with lever locking and IP69k environmental rating. It is a CANopen standard device according to CIA 301 v4.2. Typically known as a CANopen slave. The ECU-3435S unit has a very fast cycle time, two CAN ports, and 69 total configurable I/O pins.

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-2434A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	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-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-3233A Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	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

ECU-3435S Input/Output Table

Max. I/O Count	Digital In (SWG)	Digital In (SWB)	Pulse Input	Analog Input	Current Feedback	PWM	Digital Out
15	X			X			X (source)
4					X		X (source)
8							X (source)
20	X	X	X				
20					X	X (source)	X (source)
2							X (sink)
69	35	20	20	15	24	20	49

Displays

HydraForce offers several operator displays in its lineup of electronic products. These rugged programmable display units are specifically designed for use with mobile equipment. They offer the operator convenient and state-of-the-art control of machine functions, as well as visual dashboards that display machine status, operating information, or camera images.

NEW

ELD displays are 7 inch (177 mm) color TFT touchscreen displays available with either G3 cellular communication or wireless LAN. They include GPS and GLONASS navigation. With powerful 32-bit processor they can handle control of most mobile machine functions when paired with the ECU-3435S slave module. ELD displays are programmed with CoDeSys 3.5 available for free download from the HydraForce Electronics Portal at www.hydraforce.com/electronics.

Topcon Opus displays are 4.3 or 7 inch (109 or 177 mm) color TFT displays with programmable backlit softkeys. With either 532 or 800 MHz processor and 512/1024 MB flash memory these units are capable of controlling many mobile machine functions. The OPUS displays can be programmed with the easy-to-use JAVA-based OPUS Projektor software, also available for free download from the HydraForce Electronics Portal.

Features by Model

Model	ELD-6107A (NEW)	ELD-6107B (NEW)	A3S - Full	A3S - Basic	A6S - Full	A6S - Basic
Part Number	4002856	4002857	4000401	4000400	4000408	4000407
Display Size (diag.)	177 mm (7 in)	177 mm (7 in)	109 mm (4.3 in)	109 mm (4.3 in)	177 mm (7 in)	177 mm (7 in)
Resolution	800 x 480 pixel	800 x 480 pixel	480 x 262 pixel	480 x 262 pixel	800 x 480 pixel	800 x 480 pixel
Type	TFT	TFT	TFT	TFT	TFT	TFT
Touchscreen	Yes	Yes	Yes	No	Yes	No
Backlit Keys	none	none	8 soft, 3 hard	8 soft, 3 hard	12 soft, 3 hard	12 soft, 3 hard
USB Port	USB-B mini	USB-B mini	Front Panel	Rear Connection	Front Panel	Rear Connection
Inputs	3	3	4 analog / digital	none	4 analog / digital	none
Outputs	2	2	3 digital	none	3 digital	none
Video Inputs	2	2	1	none	3	none
CAN ports	2	2	2	2	2	2
Audio	Speaker	Speaker	No	No	Yes	No
Processor	32 bit 792 MHz	32 bit 792 MHz	532 MHz	532 MHz	800 MHz	800 MHz
RAM	1024 MB	1024 MB	256 MB	128 MB	128 MB	128 MB
Flash Memory	4 to 16 GB	4 to 16 GB	1GB	512MB	1GB	512MB
Wireless Network	Cellular 3G	WLAN	none	none	none	none
Geolocation	GPS/GLONASS	GPS/GLONASS	none	none	none	none
Programming	CoDeSys 3.5	CoDeSys 3.5	OPUS Projektor	OPUS Projektor	OPUS Projektor	OPUS Projektor

Telematics and Wireless Networking

HydraForce offers networking solutions for connecting your devices through WIFI or 4G/LTE cellular data networking. ECAN-1 wireless CAN gateway allows connection to the CAN network for maintenance tasks such as updating software, setting tuning parameters, or real-time data logging. ERAU-6200 remote access unit interfaces with CAN devices on the vehicle and provides global wireless networking through GSM/UMTS. The ERAU-6200 also provides global positioning through GPS/GLONASS to form a comprehensive remote machine management solution.

ECAN-1 Wireless CANbus Interface, Part No. 4002768

The ECAN-1 is a multi-functional wireless CAN interface with an integrated antenna. The device provides access to the CAN data of a vehicle or machine in various operating modes. With this device, you can transmit and receive CAN data via a WLAN connection. It can also be used as a CAN to CAN bridge or a CAN wireless interface.

When used in interface mode, the ECAN-1 transmits CAN data to other WLAN devices, such as a PC. It will work with both HF-Impulse and CoDeSys configuration software. When used as a CAN to CAN bridge, the ECAN-1 provides wireless transmission of CAN data between two ECAN-1 wireless devices, i.e. as a substitute for CAN cables in drag chains or with remote control units.

NEW

ERAU-6200 Remote Access Unit, Part No. 4002818

The ERAU-6200 Remote Access Unit is a high-performance, programmable, control and communication unit for mobile machines. The unit has multiple uses, such as data collection and display, communication gateway, remote access or edge computing. It is fully compatible with the existing HydraForce ECU line of control units and supports GlobE remote management platform, GatE secure access solution, CODESYS 3.5 WebVisu functionality, PLCopen libraries.

An open I/O and communication interface makes it possible to connect sensors, actuators, joysticks and devices from other manufacturers to optimize the whole machine. Its heavy-duty, compact aluminum housing has three anchorage points to provide firm mounting on irregular surfaces, a SIM card slot, and programmable status LEDs.

ECAN-1 Ratings

Feature	Rating
Processor	32-bit microcontroller Cortex M4
Memory	Memory expansion program flash 1024 kB EEPROM memory expansion 16 kB SRAM memory expansion 192 kB
Power	Nominal supply voltage 12/24 Vdc systems (8 to 32 Vdc)
Diagnostics	Output LED (red/green)
Interface Software	HF-Impulse
Software Installation	Download via Wi-Fi
Ingress Protection Class	IP67
Connectors	M12 5-pin
Communication Interfaces	1 x CAN
WLAN Range	75 m (245 ft)

ERAU-6200 Ratings

Feature	Rating
Processor	Dual core Coretex-A9, 32-bit CPU, 792 MHz
Flash Memory	4 GB
RAM	1024 MB (DDR3)
Non-Volatile Memory	512 kB
Operating System	Linux
Programming	CoDeSys 3.5
I/O Count	4
Ref. Voltage Output	+5 Vdc
Supply Voltage	8.4 to 36 Vdc
Power Consumption	3.5 W (+24 V idle) / 85 W (+24 V fully loaded)
Ingress Protection Class	IP 67 (with all connectors plugged in or suitably capped)
Networking	CAN 2.0A/B, GSM/UMTS, Ethernet, USB, RS232
Global Positioning	GPS/GLONASS
Diagnostics	Supply voltage, Temperature, Software cycle time, REF voltage monitoring
LED indicator	3x Red/Green/Blue

Operator Controls 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.

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
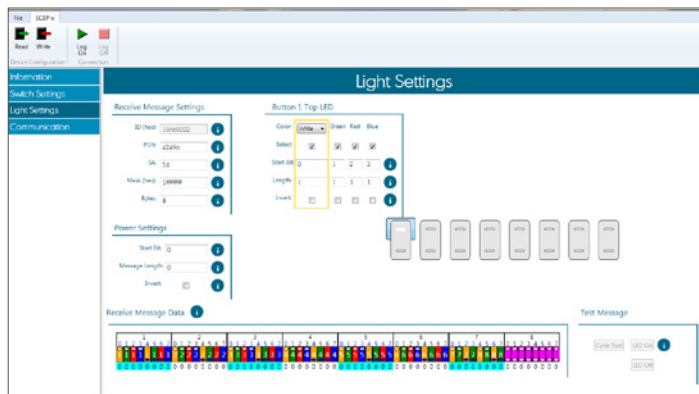
HF-Impulse configuration screen for ECBP CAN Button Panel

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.

WPS Pressure Sensors
This high-accuracy, heavy-duty series of pressure sensors offer 1% total error band accuracy accomplished with a stable, field-proven, polysilicon, thin-film pressure sensor. With shock/vibration resistance of 40/100 G and ingress protection rating of IP67, these sensors are designed especially for use in demanding mobile equipment applications.

HF Part Number	Supply Voltage	Port Size	Pressure Range
4003000	8 to 36 Vdc	G 1/4 A	0 to 50 bar (0 to 725 psi)
4003001	8 to 36 Vdc	G 1/4 A	0 to 250 bar (0 to 3625 psi)
4003002	8 to 36 Vdc	G 1/4 A	0 to 400 bar (0 to 5801 psi)
4003003	8 to 36 Vdc	SAE 6	0 to 50 bar (0 to 725 psi)
4003004	8 to 36 Vdc	SAE 6	0 to 250 bar (0 to 3625 psi)
4003005	8 to 36 Vdc	SAE 6	0 to 400 bar (0 to 5801 psi)

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

8

CoDeSys™ Development System

The CODESYS 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.

- Project tree for structuring project configuration, for example to divide the entire application into objects and tasks
- Configurator for integrating and describing various devices and fieldbus systems
- Editors for typical application development in all graphical and text-based implementation languages defined by IEC 61131-3
- Compilers for building applications in lean and powerful machine code
- Debugger, simulator, and SoftPLC (as trial target system) for direct user testing of the created applications
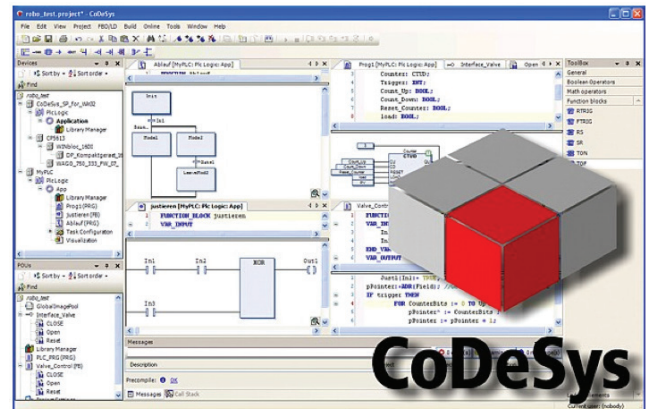
You can download CoDeSys free of charge from the HydraForce Electronics Portal at www.hydraforce.com/electronics.

HydraForce ECUs use a template file to begin program creation. **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 definitions prior to programming the device in CoDeSys editor. Contact your HydraForce representative if you wish to schedule training on ECU-Backbone.

HF-Impulse™ Software

HF-Impulse is an easy to use setup/configuration platform for the ExDR valve drivers, ECU Electronic Control Units, 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.

- Build complete machine control schemes without coding using HF-Impulse and ECDR products.
- Flash units with updated software and operating parameters
- Real-time data logging and visualization
- Service tool allows designers to set tuning parameters such as input/output scaling
- Program operation of ECBP CAN button panels
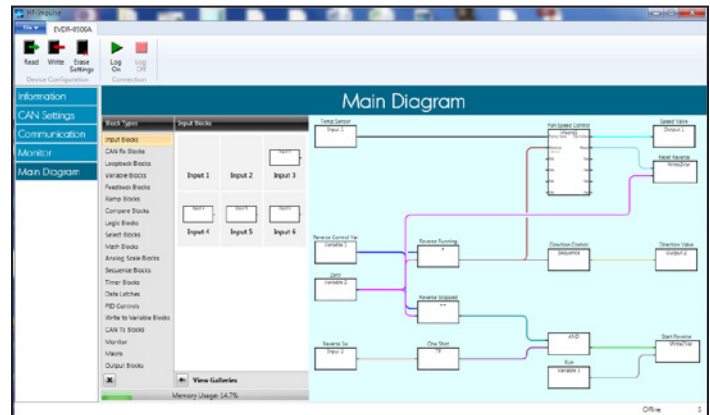
You can download HF-Impulse software free of charge on the HydraForce Electronics Portal at www.hydraforce.com/electronics. Contact your HydraForce representative if you wish to schedule training on HF-Impulse.

Custom Software

HydraForce can develop a complete control scheme for your mobile machine according to your specifications, or we can provide support for your development staff through programming examples, technical reference materials, libraries, and even customized on-site training. You can take advantage of our knowhow built from years of providing controls for HydraForce products across a multitude of mobile applications.

- Transmission controls with complex clutch filling profiles
- Machine function controls
- Operating profiles such as load-limited boom envelope
- Time-saving premium functions such as Return to Dig, Auto Bucket Shake, Auto Bucket Level
- Helpful display dashboards and monitors

Contact your HydraForce representative to discuss your custom software needs.

What is an IoT Fleet Management System?

A fleet management system uses modern technology called the Internet of Things (IoT), which allows remote access anywhere in the world from any internet-connected device. This provides your business with a wealth of fleet management tools that enable you to make more informed decisions.
In the past, software updates and support for a fleet vehicle or machine would require a service technician or engineer to make a dedicated trip into the field. This inevitably led to costly delays and unacceptable downtime. However, all that has changed through IoT and a customized fleet management system.

You can pair the ERAU-6200 remote access unit with HydraForce electronic control units (ECUs) using Epec's GatE and GlobE cloud-based service. Through HydraForce's partnership with Epec Oy of Seinajoki, Finland, we can now offer customizable IoT and telematics products for mobile hydraulic equipment applications.

Utilizing HydraForce's secure device, we will offer you the ability to effortlessly implement a software fleet management system that can help decrease downtime and improve profitability. This is accomplished by easily enabling a direct interface with your equipment in real-time—anywhere in the world.

The Benefits of an IoT Fleet Management System

Fleet management systems are entirely customizable to the specific needs of your business. There are many different benefits you'll appreciate, such as:
Reduced Fuel Costs—You can track fuel usage, idle time, and set notification alerts that will help keep idling to a minimum. Intelligent fuel management can help save money and reduce fuel costs.

Efficient Fleet Maintenance—Fleet data provided by a management system will enable you to improve efficiency, day to day operations, and help prevent costly downtime. It will also help reduce vehicle maintenance costs and improve your overall fleet operations.

Prevent Theft—GPS fleet tracking will allow you to track the driver and vehicle location and set up alerts to notify you when one has moved off a job site.

Increased Profitability—A fleet management system generates a wealth of actionable insights and data. This will allow you to plan intelligently, budget, forecast, and utilize your entire fleet in the most cost-effective way possible.

Monitor and Manage Driver Safety—Data and logs will allow you to reconstruct accidents, provide important trip information, monitor driving behavior, and view RPM and accelerometer graphs. This will enable you to improve driver behavior management and enhance your safety measures.

Improved Uptime—Through the data provided by a fleet management system, you'll be able to monitor the health of your equipment, vehicles, engine parameters, and fault codes. You'll be able to proactively perform maintenance or make repairs more efficiently.

Improve Accuracy of Job Estimates—Make laser-accurate predictions on the costs of future projects through the analysis of machine hours, fuel consumption, associated labor costs, fleet performance, and other parameters.

Customized Solutions—From railcars to farm equipment and everything in between, you can add a customized IoT fleet management solution that will help solve the toughest of challenges for fleets of all sizes.

You'll be able to vastly improve your bottom line through actionable insights provided by our fleet management software.

GatE Remote Access Service

GatE provides a secure VPN-like connection from a remote user's PC to a machine control system in the field. It provides an encrypted gateway that allows the following remote access features:

- Update control system software or download log files.
- File exchange via FTP.
- Troubleshoot complex application problems remotely.
- Remote CoDeSys online debugging for any ECU on the network.
- Access visual real-time diagnostics and maintenance data.
- Create a local service portal with CoDeSys WebVisu and use it remotely from anywhere.
- Remote desktop view with VNC.

Remote access to a machine's control system can help to reduce troubleshooting time and reduce or eliminate the need for on-site visits by field service technicians.

GlobE Cloud Service

The GlobE IoT platform provides an easy way to monitor, log and store machine control data, adjust machine settings, and update the control system on your machine. It is a proactive way to monitor, report, predict, prevent, and optimize machine hydraulic control systems.

- Increase your awareness to make data-driven decisions:
- Make productivity, problems, usage, and operating conditions visible.
- Continuously log KPIs, analyze, visualize, and report them.
- Optimize the use of resources and maximize productivity.
- Track your fleet location and activity. Prevent process bottlenecks and minimize downtime.
- Improve your future products with data.
- Utilize the "big data" to detect possible weak links in your machines.

Security

GatE Security

- Firewall Friendly — Only outbound connection is required for the SiteManager (either port 80, 443, or 11444).
- Encrypted — AES 256bit encrypted tunnel based on TLS
- 3rd Party Certification — Security audited by ProtectEm. Audit based on NIST SP800, ISECOM OSSTMM, BSI, ISA99 and IEC62443
- Two-Factor Authentication — Optionally extended with SMS code validation.
- User Management — Full per-user access control of the SiteManager gateway, even access time frames can be specified.
- Device Management — Control who can access to your devices, even down to IP address or port level.
- Audit & Reporting — All access activity is logged for auditing and to provide full transparency of user activity.
- Notifications — Get notified upon login and/or events
- Network Connectivity — Ethernet/WIFI or 3G/4G for total network separation.
- Physical Control — IO ports to physically control remote access.

GlobE Security

- User Management — Control of who can create or edit enterprises, including dashboard templates, files, users and profiles.
- Device Management — Control who gets access to what devices for viewing only or managing/writing capabilities.
- Data Storage — Per Data Center Risk Index 2016 study, Finland is the safest data center country in Europe and the fourth safest in the world.

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ASIAN/PACIFIC HEADQUARTERS

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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.