SMART POWER UNIT

Mini Power Pack with (OBE) on Board Electronic
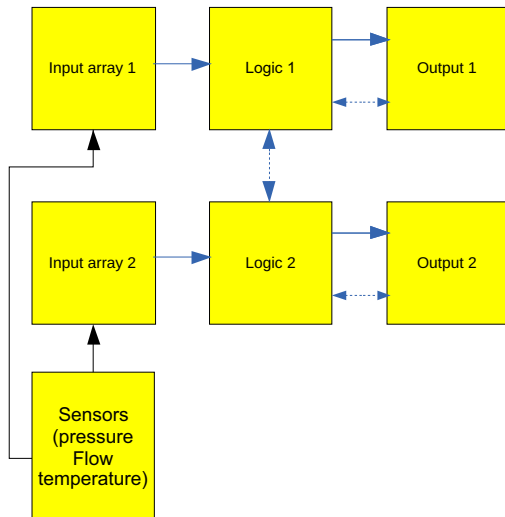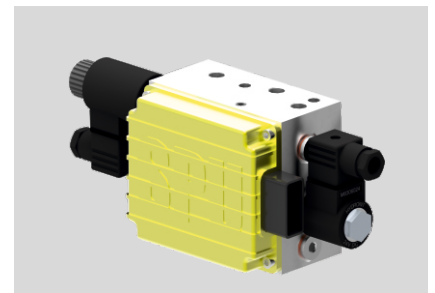
Safety Architecture up to SIL2

IEC 61131 Compliant

Hydronit

The Smart power unit (SPU)

The **SPU** is the first generation of **Programmable Modular Hydraulic Power Pack** available on the market.

The core of the Smart Power Unit is the **HPC (Hydraulic Process Controller)**: a Mechatronic Module which integrates Sensors, Electronics and Hydraulics in a single device. Programmable with **Codesys.**

Input array 1 → Logic 1 → Output 1

Input array 2 → Logic 2 → Output 2

Sensors (pressure Flow temperature)

Features

The core of the Smart Power Unit is the **HPC (Hydraulic Process Controller)**: a programmable computer with SAFETY Architecture. It integrates Input ports, sensors, double processors + an additional watchdog CPU to enable SAFETY features, power Output in order to directly drive, for example, solenoid operated proportional or on-off valves without the need of external controllers.
The **Hydraulic Process Computer** is laying on an Aluminium Hydraulic Manifold which integrates fluid pressure and temperature sensors and optional P/Q proportional control valves and LS functionality.

Hydraulic Integration

The **HPC** is perfectly integrated with the standard **Hydronit Compact Power Pack** range.
Hydraulic circuits are availble with redundant valves in order to match mechanics to electronics and offer a SAFETY RELATED mechatronic power pack, ready for **Industry 4.0** and **Smart Manufacturing**.

PATENT PENDING
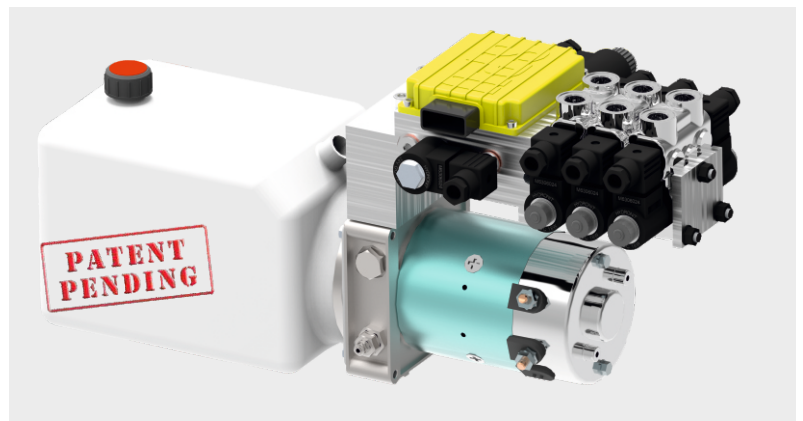
Built in Sensors

The **Hydraulic Process Computer** integrates fluid sensors: one ceramic **Pressure sensor** is applied to the Pump delivery line, reading up to 350 bar.

A second ceramic **Pressure sensor**, with reading up to 5 bar, is applied to the fluid Return line. An oil temperature sensor completes the fluid monitoring.

Sensors are embedded in the mechanic body and are available as a variable in the software programming environment.

International Awards

The **Smart Power Unit**, directly competing against European most innovative companies, has been awarded with multiple **Seals of Excellence** by the European Commission **during Horizon 2020 Framework Programme for Research and Innovation.**

The **Smart Power Unit** is patent pending.
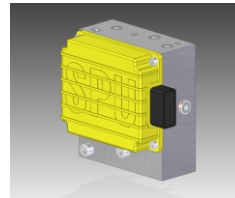
MECHATRONIC DEVICES

The HVI series is a range of programmable displays, both stand-alone or CAN-BUS, color or B&W, programmable to show data from the SPU system

Pressure sensors, position sensors, as well as planarity and angle sensors are available to feedback the machine paramenters to the SPU system automation

The HMI series is a range of peripherals such as Keyboards and Joystics for the control of SPU based systems

I/O extenders are available to increase the number of Inputs and Outputs of large SPU systems

The HPC is the core of the system. It is a mechatronic device with built-in pressure sensors, pressure and flow control valves with or without Load Sensing option. Its electronic controller is able to drive additional loads, read additional sensors in order to perform motion control and logics. It is equipped with two CANBUS lines for programming and connectivity.

Q & A

Why Mechatronics?
Choosing Hydraulic and Electronic components, developing the necessary software, design wirings brackets and enclosures is an activity that requires a huge amount of time and energies to Machines Manufacturers.
Hydronit, with SmartPowerUnit series, offers a one-stop-shop mechatronic solution in order too free time and resources to its own customers, reducing T.C.O. and TimeToMarket.

What Hydronit offers?
We offer "active" hydraulic power pack, with built in electronic and sensors ready for IOT and/or stand alone applications.

What accessories?
In addition to the Hydraulic power pack, we offer all needed peripherals for a complete automation system, such as displays, keyboards, sensors and connectors in order to grant the right compatibility level among all components, reducing time-to market a providing a complete package solution to the customer.

How do you grant the compatibility of the different devices?
Through extensive testing in different environmental conditions and applications and thanks to the in-house software development.

What if we do not want to share our know how with Hydronit?
You can program software in your facilities using our programming environments

What is Mechatronics

Hydronit has developed the world first Smart Power Unit.

A Smart Power Unit is a combination of a Compact Hydraulic Power Pack, with a Powerful electronic controller, all driven by a custom Software. This combination of electronic, hydraulic, sensors and software is called Mechatronics.
Hystorically, one of the most pervasive Mechatronic system that everyone knows is the ABS system, present in all cars, wich was the first to combine conventional hydraulics to an electronic controlling unit:

The ABS is connected to the vehicle through a set of sensors:
• pick-up sensor, reading speed of each wheel
• steering wheel angle sensor
• brake pressure sensor
• inertial platform (for ESP function)

Unlike ABS, wich is a single task device, Hydronit's SPU is programmable through a well known IDE: CoDeSys, a programming enviroment wich offers multiple coding languages for any application. The CoDeSys IDE is free for users.

Unlike ABS, wich has a rigid hydraulic scheme, Hydronit's SPU can be equipped with a wide and modular range of hydraulic components as per PPC Compact Power Packs catalogue. Additional Hydraulic components are available as NG6 (Cetop 3) proportional valves and stackable Load Sensing valves (proportional and on-off)

In order to enhance the possibilities offered by a programmable hydraulic power pack, the SPU is equipped with CAN-BUS lines, which can be connected to:
• HPC: Hydraulic Process Controllers
• HVI: Displays, Control Panels
• HMI: Keyboards, Switches, Joystick
• HSD: Sensors
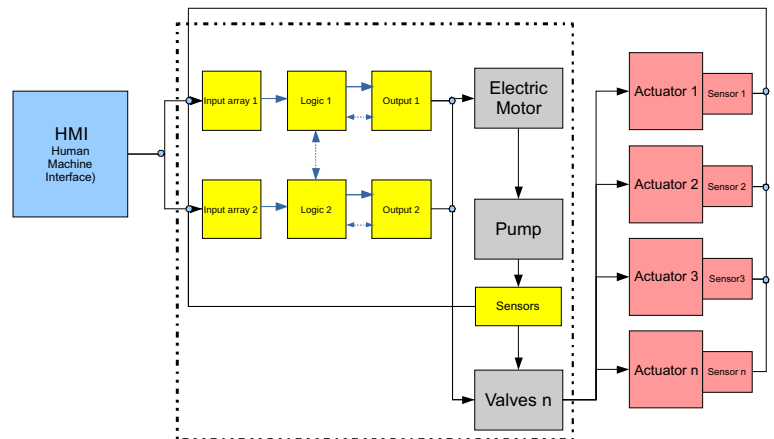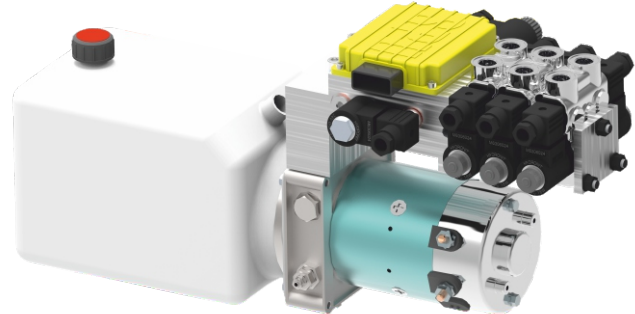
Smart Power Unit logic architecture: a **SIL2** electronic architecture ready to drive redundant hydraulic circuits

Q & A

How to customise SPU?
SPU is a programmable device, that allows free programming. The programming environment is CoDeSys, an IDE based on the international standard IEC-61131. It allows SPU programming using multiple language methods such as Function Blocks (FDB), Structured Text (ST), Ladder (LD) and others.

What is the cost of CoDeSys programming environment?
CoDeSys IDE is free for SPU customers.

What about graphics of displays and keyboard?
Graphic Displays are customised by Hydronit as per customer specifications. Keyboards are customised through the use of plastic inserts available with more than 200 symbols. On request special symbols are available.

Does Hydronit provides cable harnesses?
Connectors or simple cable harnesses are available as a standard offer. Complex machine harnesses are available on request as per customer specifications.
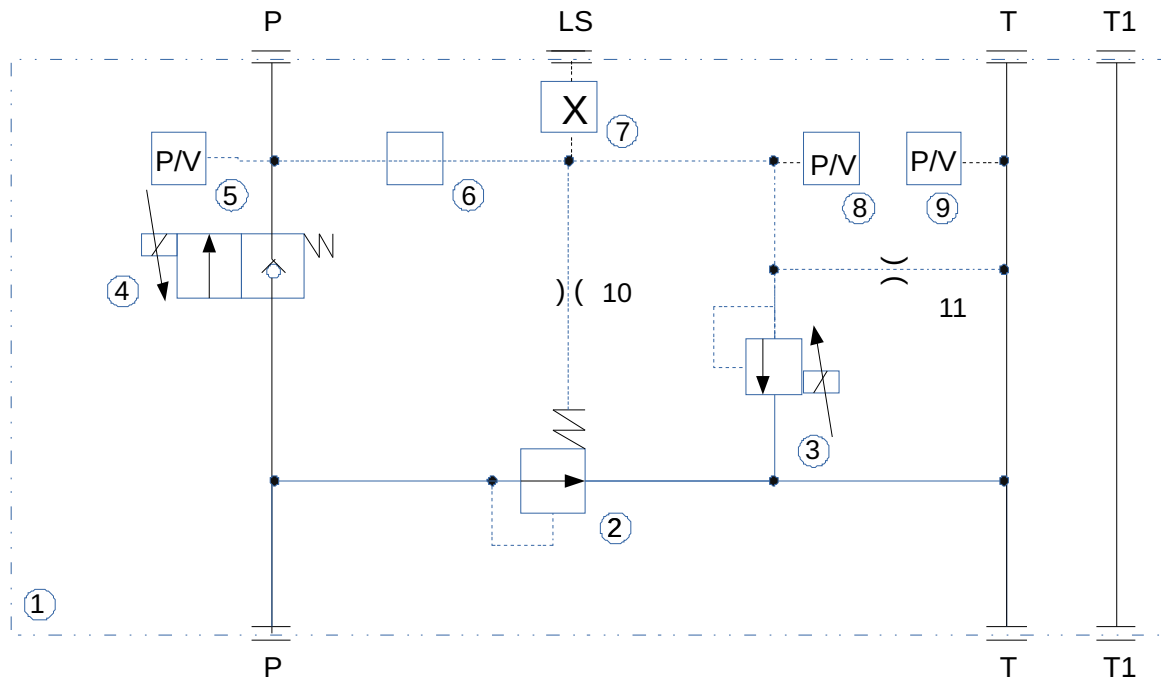
HPC01
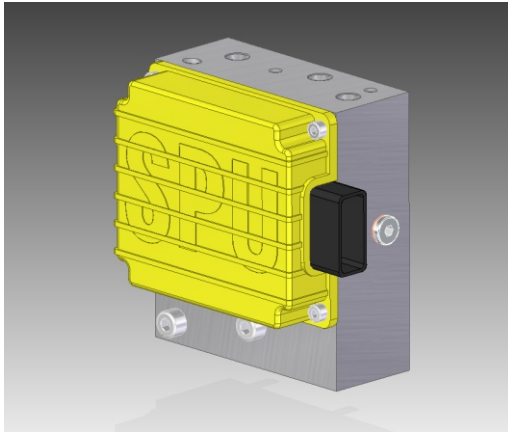
HPC01: the Hydraulic Process Controller is a Mechatronic element to be integrated into Hydronit power pack. It consists of an aluminium manifold with a proportional Flow regulator, pressure compensated, piloted by a proportional pressure relief valve. The hydraulic system is developed for the well known P/Q regulation methods and it includes a Load Sensing port to be connected with LS proportional valves. Additionally, the manifold hosts a programmable electronic controller with double processor, local Input and Output such as:

• Software configurable Analog / Digital Input
• Software configurable PWM / Current / Digital Output up to 5 Amps
• Two independent CAN-BUS lines
• Indipendent Logic and Power electric supply for safety configuration
• Internal WDO

HPC01 is supplied with 9-32V and it is able to drive up to 35A of loads, matching the most common automotive standards.
HPC01 can control DC or AC electric motors through CAN-BUS lines on through ON-OFF signals

HPC01PQ with proportional meter-in Flow and Pressure controls

HPC01PQ: Hydraulic Diagram

The PQ type diagram is useful for sequential motion in automation, normally the PQ manifold feeds an array of ON-OFF directional valves, regulating the common flow and the max pressure. PQ system allows just sequential asynchronous movements. Typical applications are: personal lift equipment, small cranes,...

The Manifold (1) contains a 3rd way pre-compensator (2) wich is sensing pressure across the proportional flow regulator (4). The proportional pressure relief valve (3) is limiting the max pressure allowed on the system. Pressure sensors (5, 8 rated for 300 bar) sense Delivery line (P) or Load Sensing Line (the other line being plugged); pressure sensor (9) is rated for max 5 bar and senses the return line pressure.
They are installed and electrically connected inside the manifold to the Logic controller. The Electronic Programmable controller drives the proportional valves according to the application software.

HPC01

HPC01LS with Load Sensing
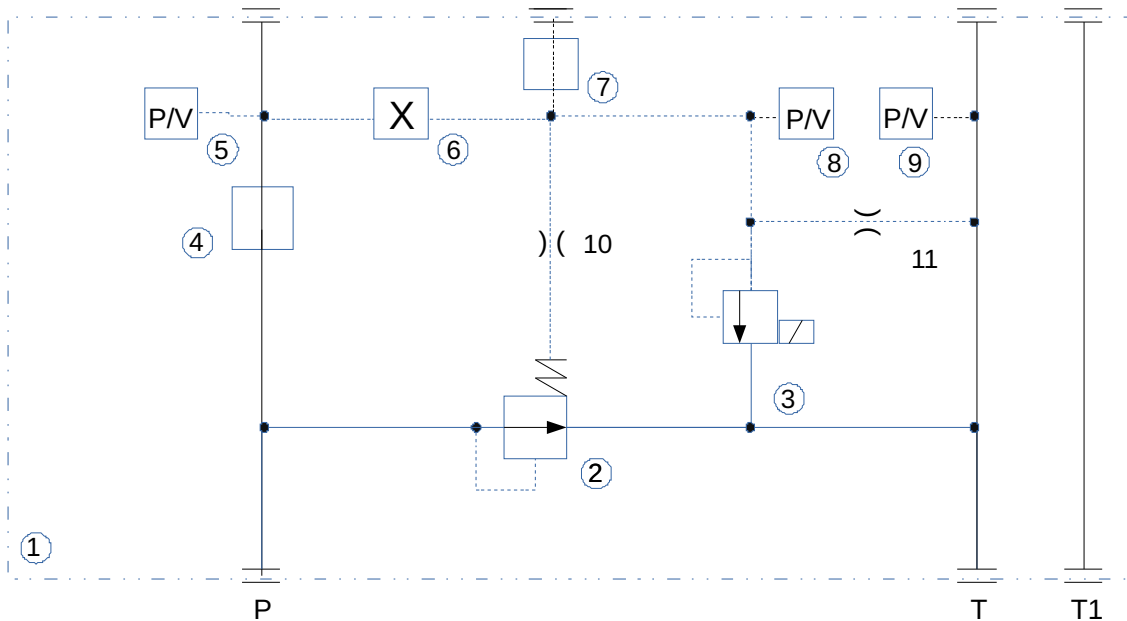
**HPC01****: Hydraulic Diagrams with Load Sensing and no proportional valves:

By replacing the Proportional Flow Control valve or/and the Proportional Pressure Relief valve with the related manual adjustment valves, and plugging/unplugging the LS lines, additional hydraulic configurations are available as well.

HPC01 is equipped with SAE08 normalised cavities in order to offer the maximum flexibility in configuration.

The Built-in controller is available on request as a stand-alone controller offered in a ABS BOX, with a design wich allows local electronic installed as close as possible to the actuators.

HPC01

HPC01LSP with LS and proportional Pressure control
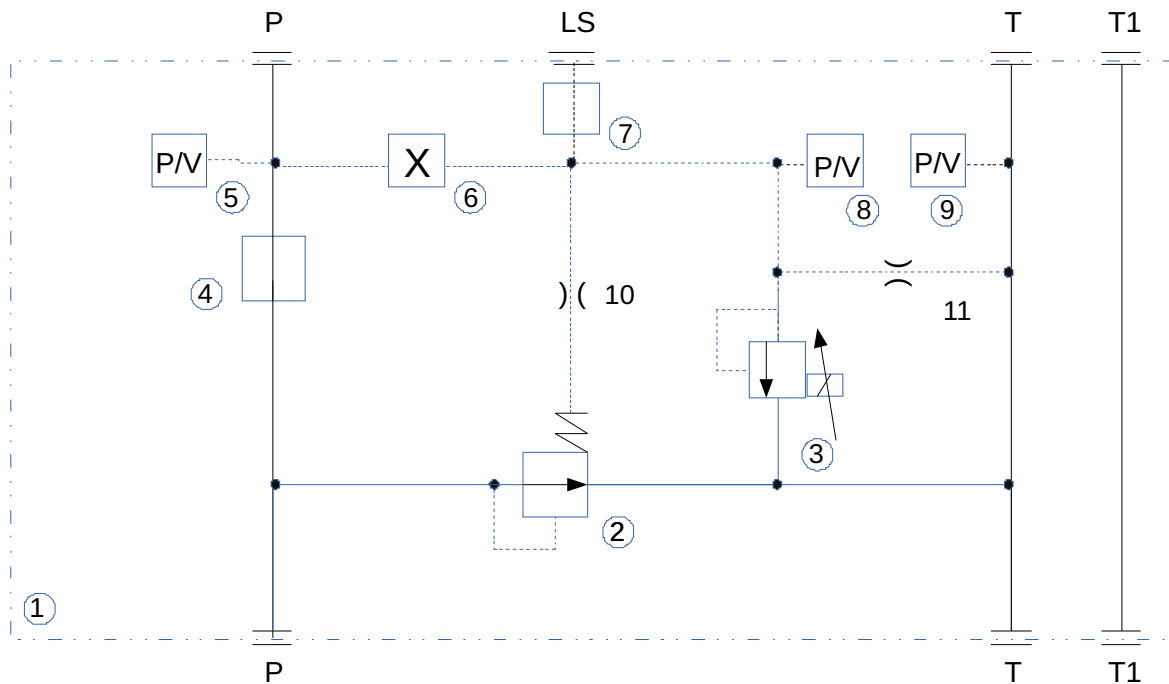
HPC01LSP: Hydraulic Diagram LS type:

The LS type diagram is useful for simultaneous motion in automation, normally the PQ manifold feeds an array of Proportional or ON-OFF LS pre-compensated valves, regulating the common flow and the max pressure in the classic LoadSensing architecture. Contemporary movements are possible.

The Manifold (1) contains a 3rd way pre-compensator (2) wich is sensing pressure across the proportional flow regulator (4). The proportional pressure relief valve (3) is piloting the max pressure allowed on the system. Pressure sensors (5 and 8 rated for 300 bar) sense Delivery line (P) and Load Sensing Line (the other line being plugged), pressure sensor (9, rated for max 5 bar) senses the return line pressure.
They are installed and electrically connected inside the manifold to the Logic controller. The Electronic Programmable controller drives the proportional valves according to the application software.

HPC01

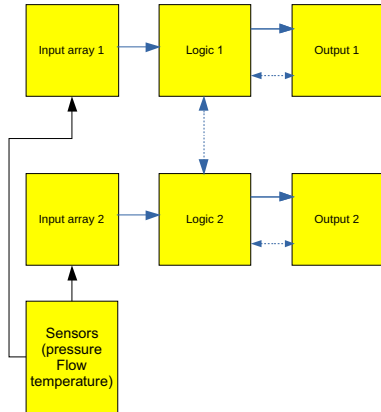### HPC01Q with proportional meter-in Flow control
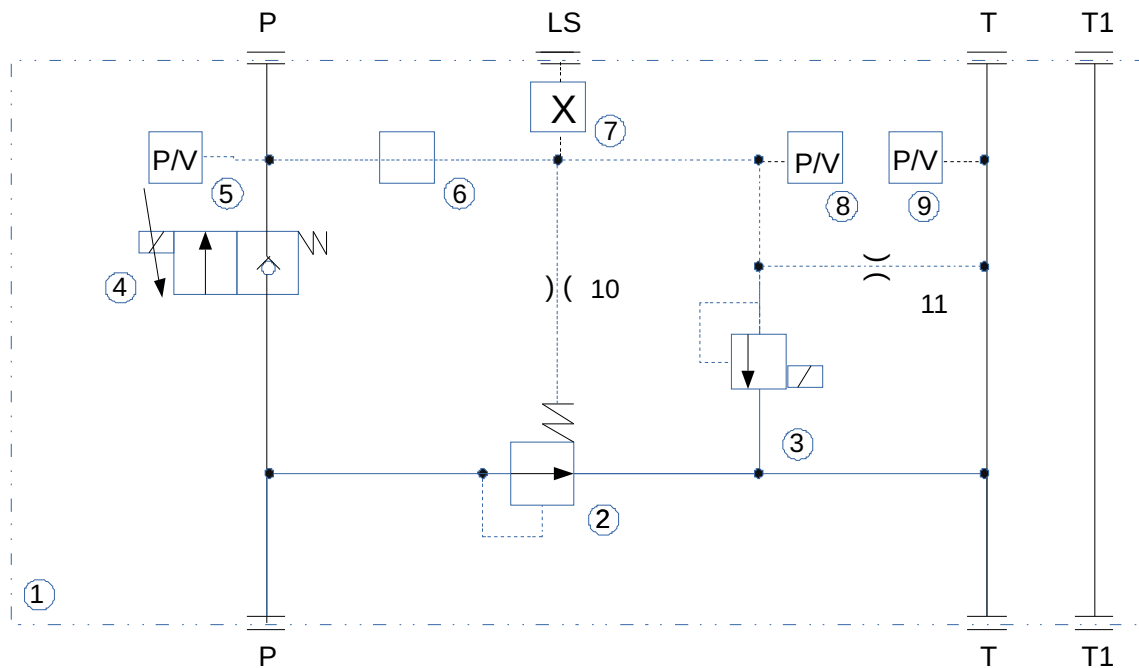
HPC01: Hydraulic Diagrams with meter-in proportional Flow control

By replacing the Proportional Flow Control valve or/and the Proportional Pressure Relief valve with the related manual adjustment valves, and plugging/unplugging the LS lines, additional hydraulic configurations are available as well.

HPC01 is equipped with SAE08 normalised cavities in order to offer the maximum flexibility in configuration.

The Built-in controller is available on request as a stand-alone controller offered in a ABS BOX, with a design wich allows local electronics installed as close as possible to the actuators.

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HPC01

the Digital Architecture of HPC consists in a double processor architecture, ready for safety applications up to SIL2 as per IEC61508 (it requires specific software and certifications, available for quantities). Each processor shares Input and Output lines with the other.

The software, developed with CoDeSys, is uploaded in both processors and in case of incongruency, the hardware Watchdog stops all movements preventig dangerous unattended movements. The Electronic controller built in the HPC is equipped with two CAN BUS lines, in order to have a fast and reliable communication of the Hydraulic Power Pack with a centralised control or, eventually, with Input peripherals or sensors. HPC is able to directly drive up to 12 ON-OFF or Proportional valves with up to 2A current, with a power supply voltage of 9 to 32VDC. Two additional ON-OFF Outputs are suitable for current up to 5A.

Each Output is equipped with current sensing: this simplifies the cable harness by reducing the number of fuses and reducing installation time. The logic supply circuit is independent from the power circuit in order to easily connect emergency circuit breaker while keeping on the logic: this extends data logger possibilities of the system, for a better reliability and troubleshooting capabilities.

Twelve multistandard inputs allow the connection of voltage or current sensors and ON-OFF proximities or keyboards

Technical data:

Voltage range:	6 … 32V DC
Current consumption:	<= 200mA
Operating temp. range:	-40 ... +85 °C
Storage temp. range:	-40 ... +85 °C
Weight:	< 0,5 Kg

IOs:

2 x 6 (12) of Digital/Analogue Inputs
0-25 mA, 0-5.5 Vdc, 0-32 Vdc

2 x 6 (12) of Digital/PWM Outputs 2A,
close current loop with ON-OFF status feedback input

2 x 1 (2) of Digital Outputs 5A,
with ON-OFF status feedback input

2 x CAN Bus ISO 11898 24 V

Mechanical shocks and vibration resistance

Sinusoidal Vibration: 5...500Hz, 7.5mm, 5g, 5 cycles , variation 1 octave/min (EN 60068-2-27);

Shock: 25g, 6ms, 4.000 shocks for every direction and axis, within the working temperature range (EN 60068-2-27);

Free fall (EN 60068-2-32 1m unit boxed); Tilt fall (EN 60068-2-31 100mm;

EMC compatibility

EN13309 (Construction Machinery)

EN61000-6-2 (Immunity for Industrial Environments)

EN61000-6-4 (Emission for Industrial Environments)

Further electrical protection

Inversion of polarity protection.
Over voltage protection (SURGE).
Load Dump Protection.

General rules compliance

European Standards:

RAEE 2002/96/EC

RoHS 2002/96/E

CPU and Memory:

2 x CPU 32 bit + 1 x "WDO" CPU 32 bit

"C" version, 120 MHz (04-25-70111)
　　　1 Mbytes of CPU internal Flash memory
　　　128 Kbytes of CPU internal RAM
　　　4 Kbyte of CPU internal RAM with lithium battery backup
　　　64 Kbyte SPI Flash memory
　　　2 x CAN Bus interface

"CoDeSys" version, 168 MHz (04-25-70115)
　　　2 Mbytes of CPU internal Flash memory
　　　256 Kbytes of CPU internal RAM
　　　4 Kbyte of CPU internal RAM with lithium battery backup
　　　64 Kbyte SPI Flash memory
　　　2 x CAN Bus interface

1 x shared 256 Kbyte SPI Flash memory for data logger function

1 x shared Real Time Clock

WDO circuit with relays

Failure Rate

Analysis method:	"Parts Count" method over all components assuming 50% dangerous failures;
Data collection:	MIL-HDBK-217F-Notice 2 and manufacturer information;
Conditions:	Normal operating conditions for environment and temperature;
Environment:	Ground, Mobile;
Temperature:	40 °C;
Operating time:	10 h/d * 6 days * 52 weeks;
Component stress:	Mean stress on components (not according to the circuit diagram);
Note:	MTTFd relates to one of two redundant channels;
MTTFd:	48 years.

HPC01 CABLE AND CONNECTOR
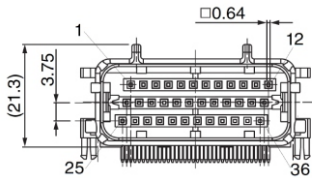
HPC01 electronic controller is equipped with a Tyco Connector in order to connect an external cable harness to the local I/O.

Cable Harness with one meter cable connected to the mating connector is available for small series or prototypes

PIN	SIGNAL	CPU	DESCRIPTION
1	DO1_B – PWM1_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
2	DO2_B – PWM2_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
3	DO3_B – PWM3_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
4	DO4_B – PWM4_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
5	DO5_B – PWM5_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
6	DO6_B	B	Digital high side Output 5A, with ON-OFF status feedback input
7	DO0_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
8	DO1_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
9	DO2_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
10	DO3_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
11	DO4_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
12	DO5_A – PWM0_A	A	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
13	DO0_B – PWM0_B	B	Digital/PWM high side Output 2A, close current loop with ON-OFF status feedback input
14	DI0_B – ADC0_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
15	CAN H 1 (AB)	AB	Can Bus line 1 High
16	CAN L 1 (AB)	AB	Can Bus line 1 Low
17	CAN H 2 (AB)	AB	Can Bus line 2 High
18	CAN L 2 (AB)	AB	Can Bus line 2 Low
19	DI0_A - ADC0_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
20	DI1_A – ADC1_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
21	DI2_A – ADC2_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
22	DI3_A – ADC3_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
23	DI4_A – ADC4_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
24	DI5_A – ADC5_A	A	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
25	+VB (logic) (AB)	AB	+ Power supply
26	-VB (logic) (AB)	AB	- Power supply
27	DI1_B – ADC1_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
28	DI2_B – ADC2_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
29	DI3_B – ADC3_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
30	DI4_B – ADC4_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
31	DI5_B – ADC5_B	B	Digital/Analogue high side Input 0-25 mA, 0-5,5 Vdc, 0-32 Vdc
32	+ VP0_A (DO0-DO3)	A	+ Power supply for outputs (DO0-DO3)
33	+ VP1_A (DO4-DO6)	A	+ Power supply for outputs (DO4-DO6)
34	+ VP0_B (DO0-DO3)	B	+ Power supply for outputs (DO0-DO3)
35	+ VP1_B (DO4-DO6)	B	+ Power supply for outputs (DO4-DO6)
36	DO6_A	A	Digital high side Output 5A, with ON-OFF status feedback input

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HPC200: I/O CAN-BUS EXTENDER

HPC200 is CANBUS Input Output Extender wich can digitize analog or digital signal such as Pressure transducers, pressure switches, flow sensors, filter clogging sensors and so on and broadcast them to an external CAN-BUS controller such as our HPC or other. HPC moreover has digital Output suitable to direct drive solonoid or starter relays through CAN BUS. on request HPC200 can be equipped with simple software to perform simple tasks such as:

☐ local driver for remotely controlled hydraulic circuit: it replaces a box with 8 relays and fuses, can be controlled by a CAN BUS keyboard

☐ hydraulic accumulator charge cycle: it manage charging/dischargimg cycle of an hydraulic accumulator thtough the use of a pressure transducer

☐ sequence driver: it perform a sequence of operations to manage the complete machine.

☐ other logics can be programmed as per customer specification
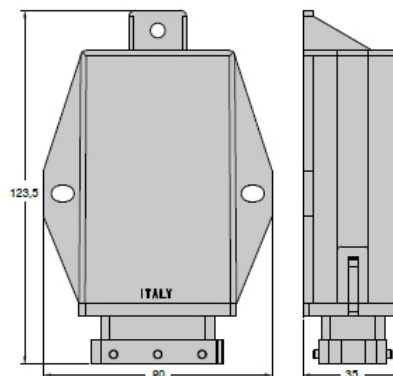
Main features

Power Supply	8 - 32 VDC
Operating temperature	-40°C / +80 °C
Ingress Protection	IP65
Connector	AMP 24 poles
Main CPU	Freescale 40MHz
Internal Memory	32K Flash (program) 1KB EEPROM
RAM	2KB
RTC	on-board
Communcation ports	1 CAN-BUS line
I/O List (optional)	6 Analog / Digital Input 8 output High-Side 2A +5V sensors supply
EMC Standard	EN61000-2, 3, 4
MTTFd	53,42Y

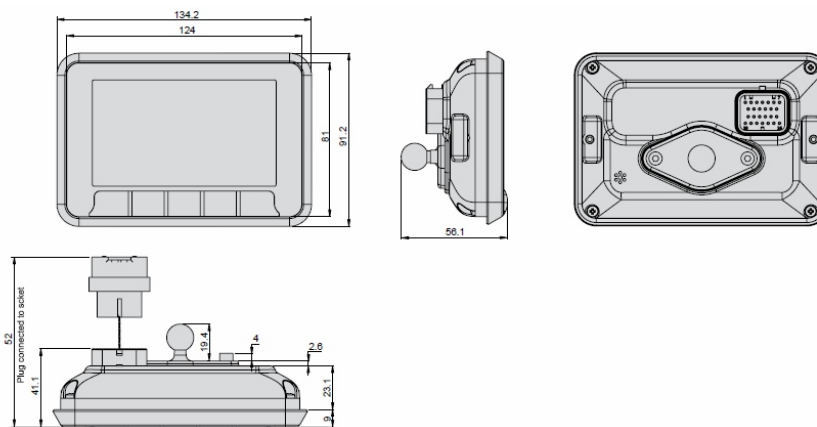| PinOut	Function	PinOut	Function
1A	OUT7	5B	A-IN0
2A	OUT5	6B	CAN R2
3A	OUT4	7B	CAN L
4A	OUT3	8B	WDO-IN
5A	OUT2	1C	+VB
6A	OUT1	2C	+5V (50mA)
7A	OUT0	3C	D-IN1
8A	+VPower	4C	D-IN2
1B	-VB	5C	A-IN1
2B	OUT6	6C	CAN H
3B	D-IN0	7C	CAN R2
4B	D-IN1	8C	WDO-OUT

HVI204: 4" PROGRAMMABLE COLOUR DISPLAY WITH CAN BUS

HVI204 is a 4" LCD Colour display with additional programmable keys available in the frame. This display is equipped with an ARM CORTEX processor, wich is programmable with a specific IDE environment available on request. HVI204 is including additional I/O ports for local data acquisition of hardware switches and sensors. The display area is QSVGA, with high contrast for good visibility under direct sunlight.

HVI204 is the ideal interface of the Hydronit Smart Power Unit, with possibility to show a big variety of machine information within a customized colorful display.

HVI204 is equipped with two CAN-Bus Lines, for the leanest connection with the Smart Power Unit, using just two wires. Additionally a USB port can be connected to an external USB connector in order to host an external memory as data Logger. a Composite Input for Video is available as option. As option local Output can be used for driving local loads as solenoid valves or light bulbs.

Main features

Power Supply	8 - 32 VDC
Operating temperature	-30°C / +70 °C
Ingress Protection	IP65
Connector	AMP 26 poles
Main CPU	ARM M4 - 180Mhz
Internal Memory	2MB Flash (program) / 64MB SDRAM (data) / 8KB EEPROM
RAM	260KB
Display	4,3"- 480 x 272 px - 800 cdm - 600:1 contr.
RTC	on-board
Buzzer	on-board
Installation	Clips or RAM mount
Communucation ports	2 CAN-BUS lines 1 USB port 1 RS232
I/O List (optional)	2 Analog / Digital Input 4 output High-Side 2A
Video In	Optional
IDE	Not Free

PinOut	Function	PinOut	Function
1	+V Battery	14	Composite In (opt)
2	-V Battery	15	GND
3	+ Ignition Key	16	RS232 TX
4	- Ignition Key	17	RS232 RX
5	CAN 1 H	18	GND
6	CAN 1 L	19	DO 1 (opt)
7	GND	20	DO 2 (opt)
8	CAN 2 H	21	DO 3 (opt)
9	CAN 2 L	22	DO 4 (opt)
10	GND	23	USB VBus
11	AI/DI 1	24	USB Host DM
12	AI / DI 2	25	USB Host DP
13	GND	26	GND

## HVI604 / 07: 4" OR 7" PROGRAMMABLE COLOUR TOUCHSCREEN WITH ETHERNET

HVI60* is a 4" or 7" colour display with touschscreen and I/O ports.
This display is equipped with an ARM9 processor, running embedded Linux, which is programmable with a specific IDE environment available for free.
HVI60* is including additional I/O ports for local data acquisition of hardware switches and sensors. The display area is QSVGA, with high contrast for good visibility under direct sunlight.

HVI60* is the ideal interface for visualisation of sensors and data logging in a machine equipped with Hydronit Smart Power Unit with possibility to show a big variety of machine information within a customized colorful display.

HVI60* is equipped with ETHERNET port and an USB port for programming and datalogger download.

Main features

Power Supply	5 - 30 VDC
Operating temperature	0°C / +40 °C
Ingress Protection	IP54
Connector	screw-in
Main CPU	ARM9 - 450Mhz
Internal Memory	1GB SDRAM, 2GB SD card
Display	4,3"- 480 x 272 px
RTC	NA
Buzzer	NA
Installation	Clips
Commununication ports	Ethernet - RS232
I/O List (optional)	4 Analog / 8 Digital Input 2 output low -Side 10mA 4PWM out
Video In	NA
IDE	Free
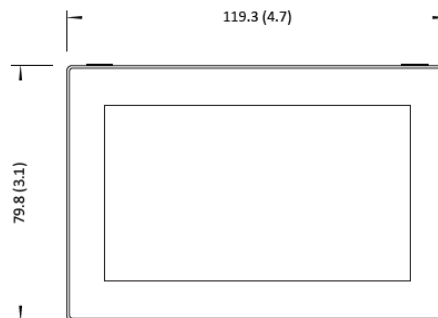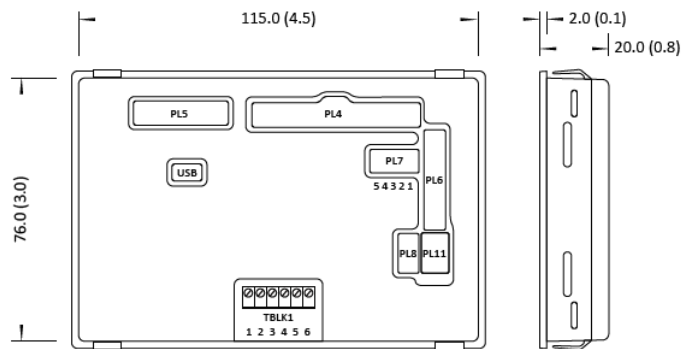
TBLK1: Power & Analogue Inputs

Pin Number	Function
1	Supply Voltage (V+)
2	0V
3	Analogue Input 4 (IN4)
4	Analogue Input 3 (IN3)
5	Analogue Input 2 (IN2)
6	Analogue Input 1 (IN1)

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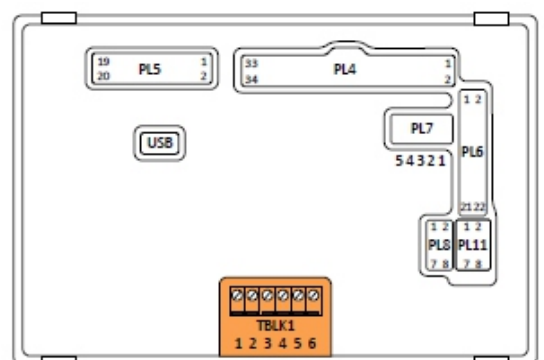
HVI203: 3" PROGRAMMABLE DISPLAY WITH TOUCHSCREEN WITH CAN BUS

HVI203 is a 3" dot matrix black/white display with touchscreen. This display is equipped with a Freescale HSC processor, which is programmable with a specific IDE environment available on request. HVI203 is including additional I/O ports for local data acquisition of hardware switches. The display area is 176 x 80mm and is best performing for small graphic and simple icons.

HVI203 is perfect as a "content sensitive keyboard": the touchscreen area can be programmed in order to simulate from 2 to 10 virtual buttons with variable icons depending on the machine function.

HVI203 is equipped with CAN-Bun line wich enable connection between with the controller with just 2 twisted wires. HVI203 is equipped with a local buzzer and backlight.

HVI203 can be installed in a panel an fixed through built-in plastic clips. as option a RAM Mount is available on request.

Main features

|	
Power Supply	9 - 32V
Operating temperature	-30 °C / +75 °C
Ingress Protection	IP65
Connector	DT06-08SA
Display dot matrix	3" - 176 x 80
Backlitght	LED
Buzzer	integrated
Installation	panel or pedestal
Input	2 analog, 1 digital
Communcation	1 CAN-Bus
Option	Touchscreen
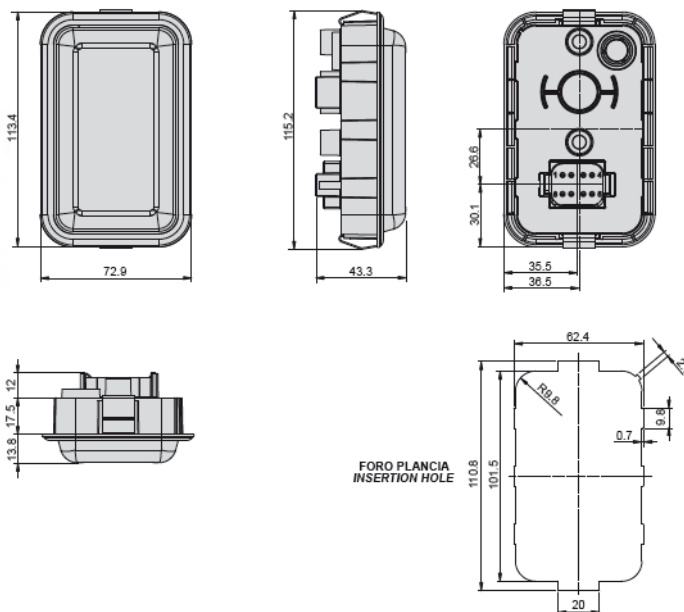
HSD-RP01

HSD-RP01 is a Roll / Pitch sensor with CAN-BUS connection.
It uses a temperature compensated accelerometric angle sensor, with high accuracy and repeatability. The sensor is equipped with a built in microprocessor that grants compensation and connectivity.
An armoured body is ideal for rough hydraulic application such as levelling systems for trucks.
The device is fully potted of resin and it is connected through a M12 connector

Main features

Power Supply	8 - 32 VDC
Operating temperature	-40°C / +70 °C
Ingress Protection	IP66
Connector	M12x1 5poles male A
Sensing Range	+/- 60° on X and Y
Accuracy	0,3°
Thermal Drift	+/- 0,001 deg/°C
Vibration resistance	EN60068-2-6
EMC Standard	EN61000-6-2; -4
MTTFd	220Y
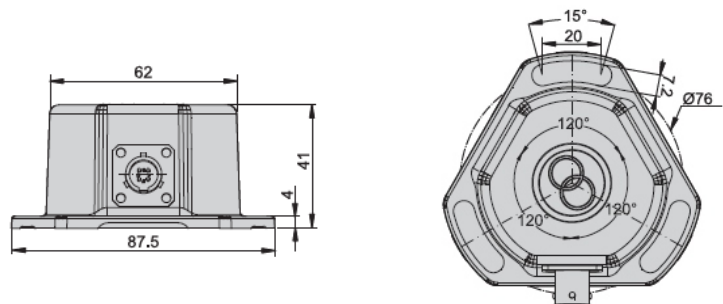
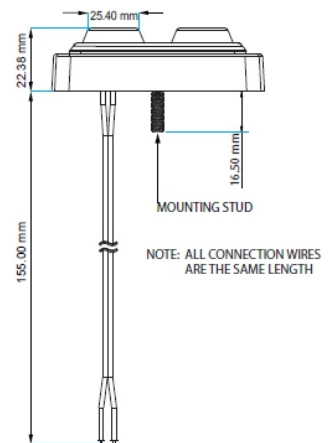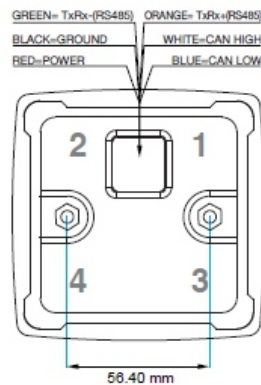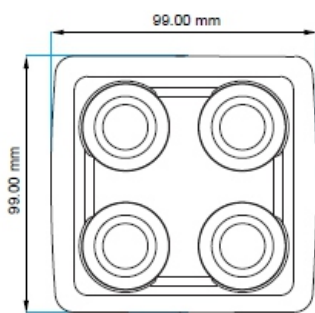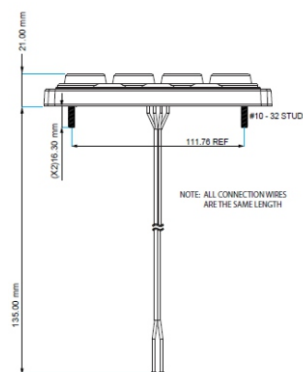| PinOut	Function
1	NC
2	+VB
3	-VB
4	CAN H
5	CAN L

Hydronit®

HMI-304 CAN-BUS KEYBOARD

HMI-304 is a CANBUS keyboard with four toggle switches, packed in a ruggerized enclosure. It is developed for OUTDOOR environment, with extended water and temperature resistance.

Big keys allow a reliable pressure sensation even with working gloves. Each key can be customised with a plastic insert wich allow a perfect match with the machine features driven by Hydronit SMART POWER UNIT. More than 200 symbols are available in order to control the machine. If a symbol is not present in our database, we can produce it on request. The keys are backlit and multiple colours can be driven by the main controller.

Main features

Power Supply	9-27 VDC
Operating temperature	-40°C / +85 °C
Ingress Protection	IP67
Connector	DT04-4P
Communication	CAN OPEN RS485

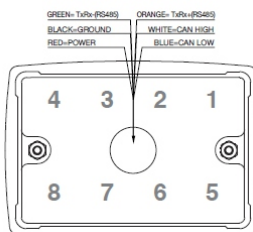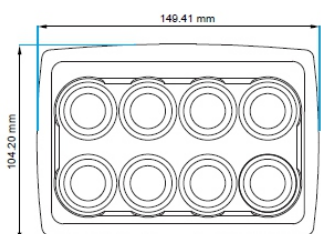| PinOut	Function
1	CAN L
2	CAN H
3	-VB
4	+VB
green cable	TxRx(RS485)
orange cable	TxRx(RS485)

HMI-308 CAN-BUS KEYBOARD

HMI-308 is a CAN BUS keyboard with 8 toggle switches, packed in a ruggerized enclosure. It is developed for OUTDOOR environment, with extended water and temperature resistance.

Big keys allow a reliable pressure sensation even with working gloves. Each key can be customised with a plastic insert wich allow a perfect match with the machine features driven by Hydronit SMART POWER UNIT. More than 200 symbols are available in order to control the machine. If a symbol is not present in our database, we can produce it on request. The keys are backlit and multiple colours can be driven by the main controller.
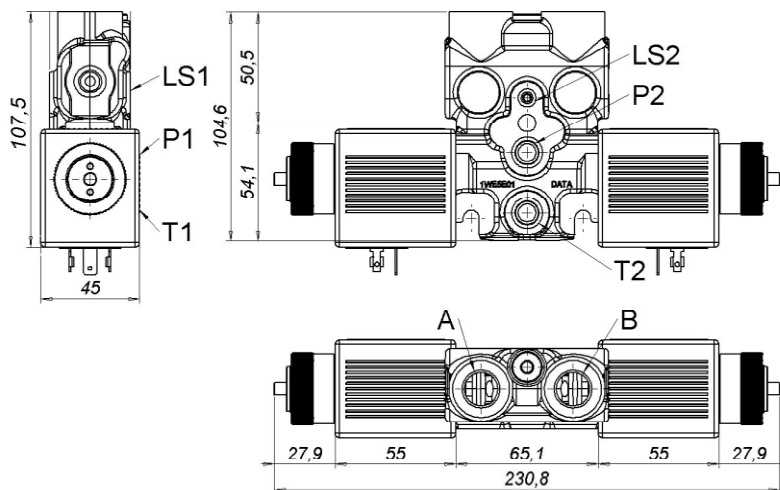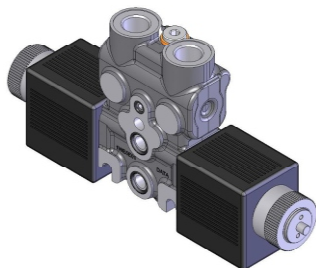

Main features

Power Supply	9-27 VDC
Operating temperature	-40°C / +85 °C
Ingress Protection	IP67
Connector	DT04-4P
Communication	CAN OPEN RS485

PinOut	Function
1	CAN L
2	CAN H
3	-VB
4	+VB
green cable	TxRx(RS485)
orange cable	TxRx(RS485)

STACKABLE ON-OFF LS ELECTROVALVE

LS1
P1
T1

107,5

50,5
104,6
54,1
45

LS2
P2
T2

A   B

27,9   55   65,1   55   27,9
230,8

Main features

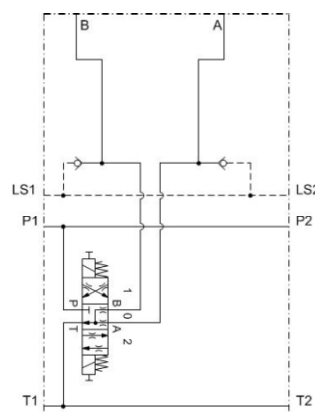|	
Max pressure	250 bar
Max pressure on T port	50 bar
Max flow	up to 40 l/min
Weight	1,6 Kg
Internal leakage	0,04 l/min at 100bar
Coil insulation	Class H
Electric connection	DIN 43650-A / ISO 4400
Protection class	IP 65 / DIN 40050
Duty cycle	ED 100%
Voltage required	+/- 10% nominal voltage
Manual Overide	push
Standards	EN50081-1 / EN50082-2 (89/336 CEE electromagnetic comp.) 73/23/CEE / 96/68/CEE (low voltage)

Spare part code

SD02	**Stackable directional on-off valve**
E2	**Spool configuration:** see table below
X	**Flow [lpm]**
TPLS	**Top Port with Load Sensing**
24DC	**Supply voltage:** **12VDC** or **24VDC**
-	**Options:** - = std

Spool

Code	A B
	a 0 b
	S2 P T S1

E2	A B
	P T

Hydraulic scheme

B   A

LS1   LS2
P1   P2

T1   T2

STACKABLE PROPORTIONAL LS ELECTROVALVE

LS1
P1
T1

LS2
P2
T2

A   B

107,5
50,5
104,6
54,1
45

27,9   55   65,1   55   27,9
230,8

Main features

|	
Max pressure	250 bar
Max pressure on T port	50 bar
Max flow	up to 40 l/min
Weight	1,6 Kg
Internal leakage	0,04 l/min at 100bar
Coil insulation	Class H
Electric connection	DIN 43650-A / ISO 4400
Protection class	IP 65 / DIN 40050
Duty cycle	ED 100%
Voltage required	+/- 10% nominal voltage
Manual Overide	push
Standards	EN50081-1 / EN50082-2 (89/336 CEE electromagnetic comp.) 73/23/CEE / 96/68/CEE (low voltage)

Spare part code

SD02	**Stackable directional on-off valve**
E2	**Spool configuration:** see table below
X	**Flow [lpm]**
TP	**Top Port**
BP	**Proportional control**
-	**Options:** - = std

Spool

Code	
E2	

Hydraulic scheme

Hydronit®
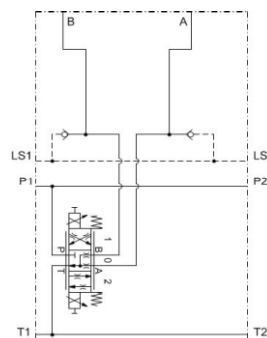
STACKABLE PROPORTIONAL LS ELECTROVALVE WITH COMPENSATOR
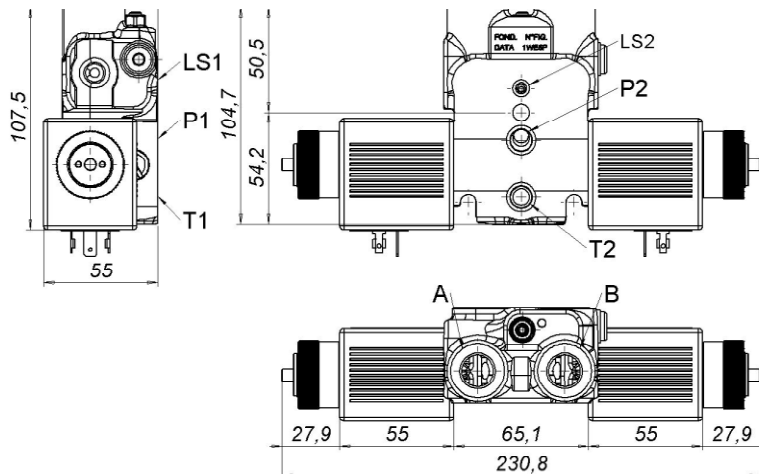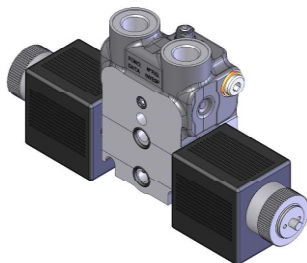
Main features

|	
Max pressure	250 bar
Max pressure on T port	50 bar
Max flow	up to 32 l/min
Weight	1,6 Kg
Internal leakage	0,04 l/min at 100bar
Coil insulation	Class H
Electric connection	DIN 43650-A / ISO 4400
Protection class	IP 65 / DIN 40050
Duty cycle	ED 100%
Voltage required	+/- 10% nominal voltage
Manual Overide	push
Standards	EN50081-1 / EN50082-2 (89/336 CEE electromagnetic comp.) 73/23/CEE / 96/68/CEE (low voltage)

Spare part code

SD02	**Stackable directional on-off valve**
E2	**Spool configuration:** see table below
X	**Flow [lpm]**
TP	**Top Port**
CP	**Proportional control with compensator**
-	**Options:** - = std

Spool

Code	
E2	

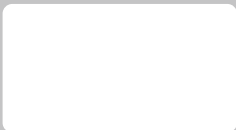### Hydraulic scheme
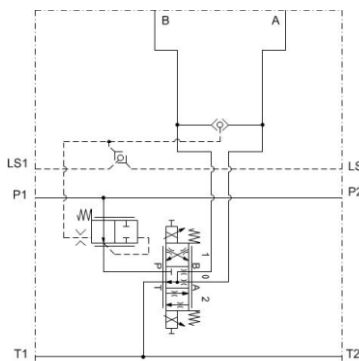
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Hydronit Srl
via Pastrengo 62
20814 Varedo (MB), Italy
☎: +39 0362 1841 210
+39 0232 0625 145
📠: +39 0362 1841 214
@: info@hydronit.com
www.minipowerpacks.com
www.hydronit.com

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