

**Контроллеры ZAPI Минск +375447584780 viber**  
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каталог, описание, технические, характеристики, datasheet, параметры,  
маркировка, габариты, фото, модуль, Fuji, fujitsu, реле

## КАТАЛОГ

модуль , igbt, мост диодный, реле

купить, продажа

## электронные компоненты

Мы не работаем с частными (физическими ) лицами. Мы работаем только с юридическими  
лицами(организациями) и ИП и только по безналичному расчёту.

[где и как купить в Минске?](#)



**Контроллеры ZAPI**

# Products



**ZAPI**<sup>®</sup>

# Applications Overview



OPERATOR CONTROL

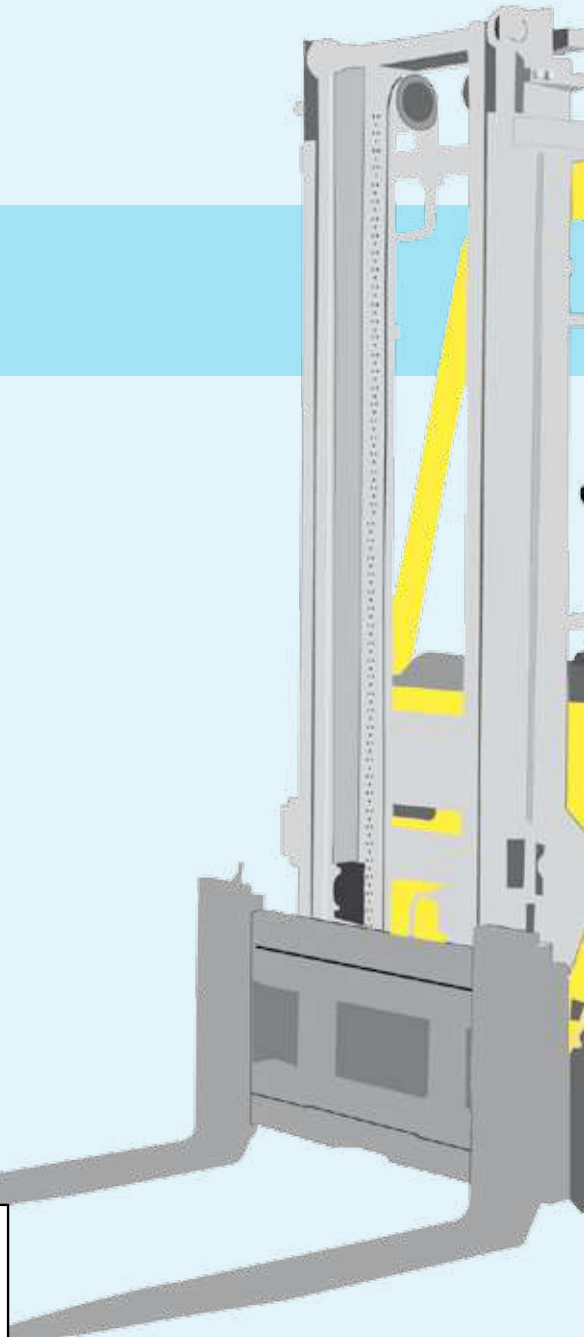
- joystick
- fingertips



DISPLAY: ZAPI GRAPHIC SMART



PUMP CONTROLLER: ZAPI ACE-3





TRACTION CONTROLLERS: ZAPI ACE-2 + ACE-2



VEHICLE CONTROL MASTER: ZAPI VCM



VALVE CONTROLLER: ZAPI MHYRIO CB

# ZAPI Technology

## Inverter for asynchronous motors

As the pioneer of AC motor controller technology, ZAPI has 20 years of experience in developing a full line of AC controllers. These units feature a multi-plex communications platform, with unmatched flexibility. ZAPI AC controllers offer enhancements in vehicle control, operation, performance and efficiency. The ZAPI family of AC controllers represent the widest range of AC products currently available in the low voltage electric vehicle market. The power capabilities of these systems range from 0.5kW to over 30kW. ZAPI is leader in development of control systems for battery powered vehicles. As a result of continuous investment in new technology, ZAPI remains the market leader in high performance AC applications.

### Inverter ACE-X & ACE-X PW - 2 $\mu$ C

The Inverter ACE-X is suitable for pedestrian, small stacker trucks, fitted with asynchronous traction motors up to 2.0kW. Double microcontroller redundant architecture.

#### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



### Inverter ACE-0 & ACE-0 PW - 2 $\mu$ C

The ACE-0 Inverter is suitable for pedestrian, small stacker trucks and order pickers fitted with asynchronous motors up to 2.5kW. Double microcontroller redundant architecture.

#### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



### Technical details

#### Power section

Power supply: 24V, 36V, 48V  
Maximum current:  
- ACE-X: 24V 165Arms (2')  
- ACE-X: 36-48V 140Arms (2')  
- ACE-X PW: 24V 240Arms (2')  
- ACE-X PW: 36-48V 210Arms (2')  
Ambient Temperature range: -40° +40° C  
Maximum heatsink temperature:  
85°C (starts to reduce current)

#### Mechanics

Dimensions: 138x180x87 mm  
Connector: Ampseal 35 poles  
Protection: IP65  
Available with Al base plate or finned heatsink

#### I/O

11 Digital inputs (input range - Batt ÷ + Batt )  
2 Analog inputs (input range 0 ÷ 12V)  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
6 Outputs driving to - Batt:  
1 Output driving to - Batt: Proportional EV, current controlled  
2 LED outputs

#### Other features

CAN-BUS Interface

### Technical details

#### Power section

Power supply: 24V 36V 48V 80V 120V  
Maximum current:  
- ACE-0: 24V 220 Arms (2')  
- ACE-0: 36-48 V: 180 Arms (2')  
- ACE-0 PW: 24V: 350 Arms (2')  
- ACE-0 PW: 36 - 48V: 320 Arms (2')  
- ACE-0 PW: 80V: 200 Arms (2')  
- ACE-0 PW: 120V: 100 Arms (2')  
Ambient temperature range: -40° +40°C  
Maximum heatsink temperature: 85°C  
(starts to reduce current)

#### Mechanics

Dimensions 150x200x79 mm  
Connector: Ampseal 35 poles  
Protection: IP65  
Available with Al base plate or finned heatsink

#### I/O

13 Digital inputs (input range - Batt ÷ + Batt )  
2 Analog inputs (input range 0 ÷ 12V )  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
2 Output driving to - Batt: Proportional EV, current controlled  
8 Outputs driving to - Batt

#### Other features

CAN-BUS Interface

## Inverter AC-X

The AC-X Inverter is suitable for pedestrian, small stacker trucks and cleaning machines fitted with asynchronous motors up to 1.2kW.

### Sensorless/Sense Coil Version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



## Technical details

### Power section

Power supply: 24V 36V 48V 80V

Maximum current:

- 24, 36V 100 Arms (2')

- 48V 80 Arms (2')

- 80V 100Arms (2')

Continuous output power: 900W

Ambient Temperature range: -30° +40° C

Maximum heatsink temperature: 78°C (starts to reduce current)

### Mechanics

Dimensions: 120x150x54 mm

Connector: Molex Minifit

Protection: IP54

### I/O

9 Digital inputs (input range -Batt ÷ + Batt)

2 Analog inputs (input range 0 ÷ 12V)

1 Analog input: Motor Temperature Sensor

1 Incremental Encoder Interface

4 Outputs driving to - Batt:

1 Output driving to + Batt (optional)

### Other features

CAN-BUS Interface

Serial Interface

## Inverter AC-0

The AC-0 Inverter is suitable for pedestrian, small stacker trucks and cleaning machines fitted with asynchronous motors up to 2.0kW.

### Sensorless/Sense Coil Version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



## Technical details

### Power section

Power supply: 24V 36V 48V

Maximum current: 200 Arms (2') (125Arms @48V)

Current booster: 10% I<sub>max</sub> 10"

Continuous output power: 1800W

Ambient Temperature range: -30° +40°C

Maximum heatsink temperature: 78°C (starts to reduce current)

### Mechanics

Dimensions: 140x180x58 mm

Connector: Molex Minifit

Protection: IP54

### I/O

9 Digital inputs (input range - Batt ÷ + Batt)

2 Analog inputs (input range 0 ÷ 12V)

1 Analog input: Motor Temperature Sensor

1 Incremental Encoder Interface

4 Outputs driving to - Batt:

1 Output driving to + Batt

### Other features

CAN-BUS Interface

Serial Interface

# ZAPI Technology

## Inverter for asynchronous motors

### Inverter ACE-2 & ACE-2 PW - 2 $\mu$ C

The ACE2 Inverter is suitable for reach and counterbalanced trucks with single or twin drive motors, high level order pickers and tow tractors fitted with asynchronous motors up to 9kW. Double microcontroller redundant architecture. Double CAN interface.

### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



### Inverter ACE-3 & ACE-3 PW - 2 $\mu$ C

The ACE3 Inverter is suitable for reach and counterbalanced trucks with single or twin drive motors and tow tractors or Electric Vehicles fitted with asynchronous motors up to 20kW. Double microcontroller redundant safety architecture. Single or double CAN architecture interface. Available both in standard or expanded I/O (premium).



### Technical details

#### Power section

Power supply: 24V 36V 48V 80V 96V

Maximum current:

- ACE2 24V 450 Arms (2')
- ACE2 36V, 48V 400 Arms (2')
- ACE2 80V 250 Arms (2')
- ACE2 96V 215 Arms (2')
- ACE2 PW 24V 550 Arms (2')
- ACE2 PW 36V, 48V 500 Arms (2')
- ACE2 PW 80V 350Arms (2')
- ACE2 PW 96V 300Arms (2')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 85°C (starts to reduce current)

#### Mechanics

ACE2 dimensions: 150x200x95 mm

ACE2 PW dimensions: 185x200x95 mm

Connector: Ampseal

Protection: IP65

Available with AI base plate or with fitted heatsink

#### I/O

3 Digital Inputs (input range - Batt ÷ + Batt )

4 Analog inputs (input range 0 ÷ 12V )

2 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

#### Other features

CAN-BUS Interface

Serial Interface

### Technical details

#### Power section

Power supply: 36/48V 72/80V 96V 120V

Maximum current:

- ACE-3 36/48V: 600 Arms (2')
- ACE-3 80V: 450 Arms (2')
- ACE-3 PW 36-48V: 650 Arms (2')
- ACE-3 PW 72/80V: 550 Arms (2')

Ambient temperature range: -40° +40°C

Maximum heatsink temperature: 85°C (starts to reduce current)

#### Mechanics

Dimensions: 200x230x103 mm

Connector: Ampseal 23 poles (2 x 23 poles in premium version)

Protection: IP65

Available with AI base plate or finned heatsink

#### I/O

5 Digital inputs

2 Analog inputs

2 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

#### I/O Premium Version

10 Digital inputs

5 Analog inputs

7 Outputs driving to - Batt: pwm or ON/OFF, voltage controlled

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

Different speed sensors can be connected: Incremental Encoder, 3-hall sensors (BLDC), Sin/cos sensor

#### Other features

CAN-BUS Interface (2 lines in Premium version)

## Inverter AC-2

The AC-2 Inverter is suitable for reach and counterbalanced trucks with single or twin drive motors, high level order pickers, and tow tractors fitted with asynchronous motors up to 9kW.

## Inverter AC-3 2μC

The AC-3 Inverter is suitable for tow tractors and counterbalanced trucks fitted with asynchronous motors up to 20kW.



### Technical details

#### Power section

Power supply: 24V 36V 48V 72V 80V 96V 120V  
Maximum current:  
AC-2 24, 36V 550 Arms (2') - 36, 48V 550 Arms (2')  
72-80V 500 Arms (2') - 96V 350 Arms (2')  
AC-3 36V 600 Arms (3') - 48V 600 Arms (3')  
72V 600 Arms (3') - 80V 600 Arms (3')  
96V 500 Arms (3') - 120V 500 Arms (3')

#### Continuous output power:

AC-2 24V 5000W - 48V 6500W - 80V 9000W  
AC-3 48V 10000W - 80V 20000W

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 75°C  
(starts to reduce current)

#### Mechanics

AC-2 Dimensions: 200x230x111 mm  
AC-3 Dimensions: 250x300x111 mm  
AC-2 Connector: Molex Minifit  
AC-3 Connector: Molex Minifit / Amp Saab / Ampseal  
Protection: IP54 / IP65 (AC-3 only)  
Available with AI base plate or with fitted heatsink

#### I/O

8 Digital inputs (input range - Batt ÷ + Batt)  
2 Analog inputs (input range 0 ÷ 12V)  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
2 Outputs driving to - Batt:

#### Other features

CAN-BUS Interface

## Inverter ACE4 - 2μC

The ACE4 Inverter is suitable for counterbalanced trucks up to 8 tons, Tow Tractors and Airport Ground Support Vehicles, Aerial (telescopic boom and scissor lift) access equipment, fitted with asynchronous motors up to 20kW.

Double microcontroller redundant architecture.  
Available both in standard or expanded I/O (premium).

### Technical details

#### Power section

Power supply: 36V 48V 80V 96V 120V  
Maximum current:  
- 36V 1000Arms (2')  
- 48V 875Arms (2')  
- 80V 700 Arms (2')  
- 96V 500 Arms (2')  
- 120V 400 Arms (2')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 85 °C  
(starts to reduce current)

#### Mechanics

Dimensions: 204 x 235 x 103 mm  
Connector: Ampseal 23 poles  
(35 poles for Premium version)  
Protection: IP65  
Available with AI base plate or with fitted heatsink

#### I/O

5 Digital Inputs (input range - Batt ÷ + Batt )  
2 Analog inputs (input range 0 ÷ 12V )  
2 Outputs driving to - Batt:  
1 Output driving to - Batt: Proportional EV,  
current controlled  
1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

#### I/O Premium

11 Digital Inputs (input range - Batt ÷ + Batt )  
4 Analog inputs (input range 0 ÷ 12V )  
6 Outputs driving to - Batt:  
1 Output driving to - Batt: Proportional EV,  
current controlled  
1 Incremental Encoder Interface  
1 Analog input: Motor Temperature Sensor

#### Other features

CAN-BUS Interface

## Inverter ACE5 - 2μC

The ACE5 Inverter is suitable for road vehicles, large tow tractors and counterbalanced trucks fitted with asynchronous motors up to 30kW.  
Double microcontroller redundant architecture.



### Technical details

#### Power section

Power supply: 48V 72V 80V 96V 120V  
Maximum current:  
- 48V 1000 Arms (3')  
- 72V 1000 Arms (3') - 80V 1000 Arms (3')  
- 96V 800 Arms (3') - 120V 750 Arms (3')  
Continuous output power:  
(48V) 18000W - (80V) 30000W  
Ambient Temperature range: -40° +40° C  
Maximum heatsink temperature: 75°C  
(starts to reduce current)

#### Mechanics

Dimensions: 370x300x144 mm  
Connector: Ampseal  
Protection: IP65  
Available with AI base plate or fitted heatsink

#### I/O

8 Digital inputs (input range - Batt ÷ + Batt)  
2 Analog inputs (input range 0 ÷ 12V)  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
2 Outputs driving to - Batt:

#### Other features

CAN-BUS Interface  
Serial Interface

# ZAPI Technology

## Combi inverter for asynchronous motors

The COMBI is an inverter for an AC traction motor with an integrated pump motor controller.

### Combi AC-X & Combi AC-X PW - 2 $\mu$ C

The COMBI AC-X CONTROLLER is suitable for pedestrian, small stacker trucks, fitted with asynchronous traction motors up to 2.0kW, and DC series pump motors up to 5kW. Double microcontroller redundant architecture.

#### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



#### Technical details

##### Power section

Power supply: 24V 36V 48V  
Maximum current:  
- Combi AC-X: 24V 165Arms (2') + 270Adc pump  
- Combi AC-X: 36-48V 140Arms (2') + 240Adc pump  
- Combi AC-XPW: 24V 240Arms (2') + 270Adc pump  
- Combi AC-XPW: 36-48V 210Arms (2') + 240Adc pump  
Ambient Temperature range: -40° +40° C  
Maximum heatsink temperature:

85°C (starts to reduce current)

##### Mechanics

Dimensions: 138x180x87 mm  
Connector: Ampseal 35 poles  
Protection: IP65  
Available with Al base plate or finned heatsink

##### I/O

11 Digital inputs (input range - Batt ÷ + Batt)  
2 Analog inputs (input range 0 ÷ 12V)  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
6 Outputs driving to - Batt  
1 Output driving to - Batt: Proportional EV, current controlled  
2 LED outputs

##### Other features

CAN-BUS Interface

### Combi AC-0 & Combi AC-0 PW Controller - 2 $\mu$ C

The COMBI AC-0 Controller is suitable for pedestrian, small stacker trucks, and order pickers fitted with asynchronous motors up to 2.5kW, and DC series pump motor up to 5kW. Double microcontroller redundant architecture.

#### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



#### Technical details

##### Power section

Power supply: 24V 36V 48V 80V  
Maximum current:  
- Combi AC-0: 24 V: 220 Arms (2') + 400 A DC pump  
- Combi AC-0 36 - 48 V: 180 Arms (2') + 300 A DC pump  
- Combi AC-0 PW 24 V: 350 Arms (2') + 400 A DC pump  
- Combi AC-0 PW 36 - 48 V: 320 Arms (2') + 300 A DC pump  
- Combi AC-0 PW 72 - 80 V: 200 Arms (2') + 200 A DC pump  
Ambient Temperature range: -40° +40°C  
Maximum heatsink temperature: 85°C  
(starts to reduce current)

##### Mechanics

Dimensions: 150x200x79 mm  
Connector: Ampseal  
Protection: IP65  
Available with Al base plate or finned heatsink

##### I/O

13 Digital inputs (input range - Batt ÷ + Batt)  
2 Analog inputs (input range 0 ÷ 12V)  
1 Analog input: Motor Temperature Sensor  
1 Incremental Encoder Interface  
2 Outputs driving to - Batt: Proportional EV, current controlled  
8 Outputs driving to - Batt

##### Other features

CAN-BUS Interface

## Combi AC-1 Controller - 2 $\mu$ C

The COMBI AC-1 Controller is suitable for pedestrian, small stacker trucks, and order pickers fitted with asynchronous traction motors up to 3.5kW, and DC series pump motors up to 7.5kW.

Double microcontroller redundant architecture.

### Sensorless/Sense Coil version

Same as above but with ZAPI patented sensorless/sense coil control algorithm to be used with encoderless AC motor.



## Technical details

### Power section

Power supply: 24V 36V 48V 80V

Maximum current:

- 24V 350 Arms (2') + 350 A DC pump

- 36V 350 Arms (2') + 350 A DC pump

- 48V 300 Arms (2') + 300 A DC pump

- 80V 225 Arms (2') + 225 A DC pump

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 85°C  
(starts to reduce current)

### Mechanics

Dimensions: 150x230x125 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or with finned heatsink

### I/O

10 Digital inputs (input range - Batt ÷ +Batt )

2 Analog inputs (input range 0 ÷ 12V )

1 Analog input: Motor Temperature Sensor

1 Incremental Encoder Interface

8 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

### Other features

CAN-BUS Interface (also with CAN tiller card)

Serial Interface

## Inverter Combi AC-2 & Combi AC-2 PW

COMBI AC-2 POWER Inverter is suitable for counterbalanced trucks and reach trucks with single traction motor and AC pump in the 4 to 8kW power range.



## Technical details

### Power section

Power supply: 24V 36V 48V 72V 80V

Maximum current:

Combi AC-2 24V 350+350 Arms (3')

36V, 48V 330+330 Arms (3')

72V, 80V 320+320 Arms (3')

Combi AC-2 PW

24V 500+500 Arms (3')

36V, 48V 450+450 Arms (3')

72V, 80V 400+400 Arms (3')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 75°C

(starts to reduce current)

### Mechanics

Dimensions: 250x340x129 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or with finned heatsink

### I/O

6 Digital inputs (input range - Batt ÷ + Batt )

3 Analog inputs (input range 0 ÷ 12V )

3 Outputs driving to - Batt:

2 Incremental Encoder Interface

2 Analog input: Motor Temperature Sensor

### Other features

2 microcontrollers

CAN-BUS Interface

Serial Interface

# ZAPI Technology

## Inverters for dual asynchronous motor applications

This controller is suitable for medium and large electric vehicles fitted with dual AC traction motors up to 8kW each (counterbalanced truck, tow tractor), used in high performance applications. General features: MOSFET Technology, microprocessor logic, faults memory, digital programming via console, regenerative braking.

### Inverter Dual AC-2 & Dual AC-2 PW

The inverter is suitable for counterbalanced trucks, reach trucks, and tow tractors with twin traction motors in the 3 to 8kW power range.



### Technical details

#### Power section

Power supply: 24V 36V 48V 72V 80V

Maximum current:

- Dual AC-2 24V 350+350 Arms (3')
- Dual AC-2 36V, 48V 330+330 Arms (3')
- Dual AC-2 72V, 80V 300+300 Arms (3')
- Dual AC-2 PW 24V 500+500 Arms (3')
- Dual AC-2 PW 36V, 48V 450+450 Arms (3')
- Dual AC-2 PW 72V, 80V 500+500 Arms (3')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 75°C  
(starts to reduce current)

#### Mechanics

Dimensions Dual AC-2: 200x322x129 mm

Dimensions Dual AC-2 PW: 250x340x129 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or with finned heatsink

#### I/O

6 Digital inputs (input range - Batt ÷ + Batt)

3 Analog inputs (input range 0 ÷ 12V)

3 Outputs driving to - Batt:

2 Incremental Encoder Interface

2 Analog input: Motor Temperature Sensor

#### Other features

2 microcontrollers

CAN-BUS Interface

Serial Interface

### Inverter Dual AC-2 & HP / Inverter Dual AC-2 & HP PW

The inverter is suitable for counterbalanced trucks, reach trucks and tow tractors with twin traction motors in the 3 to 8kW power range. The unit has an integrated chopper for the control of a DC pump motor.



### Technical details

#### Power section

Power supply: 24V 36V 48V 72V 80V

Maximum current:

- Dual AC-2 & HP 24V 350+350 Arms+500 A DC pump (3')
- Dual AC-2 & HP 36V, 48V 330+330 Arms+450 A DC pump (3')
- Dual AC-2 & HP 72V, 80V 300+300 Arms+400 A DC pump (3')
- Dual AC-2 & HP PW 24V 500+500 Arms+500 A DC pump (3')
- Dual AC-2 & HP PW 36V, 48V 450+450 Arms+450 A DC pump (3')
- Dual AC-2 & HP PW 72V, 80V 500+500 Arms+400 A DC pump (3')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 75°C  
(starts to reduce current)

#### Mechanics

Dimensions Dual AC-2 & HP: 200x400x129 mm

Dimensions Dual AC-2 & HP PW: 250x420x129 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or with finned heatsink

#### I/O

12 Digital inputs (input range - Batt ÷ + Batt)

4 Analog inputs (input range 0 ÷ 12V)

3 Outputs driving to - Batt:

2 Incremental Encoder Interface

2 Analog input: Motor Temperature Sensor

#### Other features

2 microcontrollers

CAN-BUS Interface

Serial Interface

## Inverters for high voltage applications

The High Voltage is a controller capable of operating with a voltage up to 720V and suitable for AC induction, BLDC and PMAC motors, in the range from 15 to 30 Kw continuous power, for traction, pump and auxiliary functions of electric/hybrid vehicles. Thanks to this characteristic it can operate both with battery packs which are common in electric/hybrid markets (lithium types) and with an high voltage dc-link stabilized by a generator.

### High Voltage Inverter



### Technical details

#### Power section

Nominal DC voltage: 650 V DC  
Maximum DC voltage: 720 V DC  
Logic supply: 12, 24V  
Maximum current : 70 A (60 sec);  
Continuous output current: 45 A  
Maximum output power: 55 kVA (60 sec)  
Continuous output power : 35 kVA  
Switching frequency: 2-8 KHZ, fixed, auto-adjusted  
Ambient temperature range: -40° +85°C  
Maximum power section temperature: 90°C (starts to reduce current @ 60°C)

#### Mechanics

Dimensions: 250x200x87 mm  
Mass: 4,5 Kg  
Liquid cooling dissipation: 600W (6l/min; Tliquid=60°C);  
Also available in forced air cooled version.  
Connector: Molex CMC 48 poles  
Protection: IP6K9K

#### I/O

5 Digital inputs; connection: active to +12 / 24V.  
1 Resolver Interface (1output / 2input). Can be used also for SIN / COS sensor or as analog input (range 0-12V)  
1 Incremental Encoder Interface + index. These can be customized to be used for Hall sensor (BLDC motor control), upon request  
2 Insulated analogue motor thermal sensor input  
1 Analog input general purpose  
1 Output driving to low voltage negative, 2,5 A continuous, PWM voltage control.  
2 Outputs driving to low voltage negative, 1 A continuous, PWM voltage control, ON/OFF control

#### Communication

2 X canbus port  
Communication speed up to 500 Kbit/sec  
Opto-insulated can transceiver, esd protected  
11 and 29 bits communication supported  
Compatible with different standard CAN protocol

#### Other features

FOC motor control for ACIM and PMAC motors with field weakening  
6 step motor control for BLDC motors  
Resolver, Sin-Cos, Encoder Feedback  
Fully automated self-check at start-up  
Automatic protection against over heating  
HVIL - High Voltage Connection Supervision

# ZAPI Technology

## PMAC & DC Brushless controllers

With a well proven reliability on the market these units feature a multiplex communication platform with unmatched flexibility. Zapi family of BLAC and BLDC controllers covers the range from 0.5kW to 15kW applications.

### BL-X Controller

The BL-X controller is suitable for Brushless AC and DC motors up to 1kW.



#### Technical details

##### Power section

Power supply: 24V 36V 48V  
 Maximum current: 130 Arms (2')  
 Continuous output power: 900W  
 Ambient Temperature range: -30° +40° C  
 Maximum heatsink temperature: 78°C  
 (starts to reduce current)

##### Mechanics

Dimensions: 120x150x54 mm  
 Connector: Molex Minifit  
 Protection: IP54

##### I/O

8 Digital inputs (input range - Batt ÷ + Batt)  
 2 Analog inputs (input range 0 ÷ 12V)  
 3 Digital Hall sensor inputs  
 4 Outputs driving to - Batt:  
 1 Output driving to +Batt (optional)  
 1 Incremental Encoder Interface  
 1 Analog input: Motor Temperature Sensor

##### Other features

CAN-BUS Interface  
 Serial Interface

### BLE-X & BLE-X PW Controller - 2μC

The BLE-X controller is suitable for Brushless AC and DC motors up to 2kW. Double microcontroller redundant architecture.



#### Technical details

##### Power section

Power supply: 24V, 36V, 48V  
 Maximum current:  
 - BLE-X: 24V 165Arms (2')  
 - BLE-X: 36-48V 140Arms (2')  
 - BLE-X PW: 24V 240Arms (2')  
 - BLE-X PW: 36-48V 210Arms (2')  
 Ambient Temperature range: -40° +40° C  
 Maximum heatsink temperature:  
 85°C (starts to reduce current)

##### Mechanics

Dimensions: 138x180x87 mm  
 Connector: Minifit or Ampseal  
 Protection: IP54/IP65  
 Available with Al base plate or  
 finned heatsink

##### I/O

9 Digital inputs (input range - Batt ÷ + Batt)  
 2 Analog inputs (input range 0 ÷ 12V)  
 1 Analog input: Motor Temperature Sensor  
 1 Incremental Encoder Interface + Index,  
 1 Sin/Cos Interface, 3 Digital Hall Sensors  
 Interface (with reduction of digital input  
 number)  
 1 PWM position signal input  
 7 Outputs driving to - Batt  
 1 Output driving to - Batt: Proportional EV,  
 current controlled  
 2 LED Outputs  
 1 Analog input: Motor Temperature  
 Sensor

##### Other features

CAN-BUS Interface

### BLE-0 & BLE-0 PW Controller - 2μC

The BLE-0 controller is suitable for Brushless AC and DC motors up to 2.5kW. Double microcontroller redundant safety architecture.



#### Technical details

##### Power section

Power supply: 24V 36V 48V 80V 120V  
 Maximum current:  
 - BLE-0: 24V 220 Arms (2')  
 - BLE-0: 36-48 V: 180 Arms (2')  
 - BLE-0 PW: 24V: 350 Arms (2')  
 - BLE-0 PW: 36 - 48V: 320 Arms (2')  
 - BLE-0 PW: 72 - 80V: 200 Arms (2')  
 - BLE-0 PW: 120V: 100 Arms (2')  
 Ambient temperature range: -40° +40°C  
 Maximum heatsink temperature: 85°C  
 (starts to reduce current)

##### Mechanics

Dimensions 150x200x79 mm  
 Connector: Ampseal  
 Protection: IP65  
 Available with Al base plate or  
 finned heatsink

##### I/O

9 Digital inputs (input range - Batt ÷ + Batt)  
 2 Analog inputs (input range 0 ÷ 12V )  
 1 Analog input: Motor Temperature Sensor  
 1 Incremental Encoder Interface + Index,  
 1 Sin/Cos Interface, 3 Digital Hall sensors  
 Interface (with reduction of digital input  
 number)  
 2 Outputs driving to - Batt: Proportional EV,  
 current controlled  
 8 Outputs driving to - Batt  
 1 PWM position signal input

##### Other features

CAN-BUS Interface

## BLE-2 & BLE-2 PW Controller - 2 $\mu$ C

The BLE-2 controller is suitable for Brushless AC and DC motors up to 8kW. Double microcontroller redundant architecture. Double CAN interface.



### Technical details

#### Power section

Power supply: 24V 36V 48V 80V 96V

Maximum current:

- BLE-2 24V 450 Arms (2')
- BLE-2 36V, 48V 400 Arms (2')
- BLE-2 80V 250 Arms (2')
- BLE-2 96V 215 Arms (2')
- BLE-2 PW 24V 550 Arms (2')
- BLE-2 PW 36V, 48V 500 Arms (2')
- BLE-2 PW 80V 350 Arms (2')
- BLE-2 PW 96V 300 Arms (2')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 85°C (starts to reduce current)

#### Mechanics

BLE-2 dimensions: 150x200x95 mm

BLE-2 PW dimensions: 185x200x95 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or with finned heatsink

#### I/O

3 Digital Inputs (input range - Batt ÷ + Batt )

2 Analog inputs (input range 0 ÷ 12V )

2 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface, 1 Sin/Cos Interface, 3 Digital Hall Sensors Interface (with reduction of digital input number)

1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

#### Other features

CAN-BUS Interface

Serial Interface

## BLE-3 & BLE-3 PW Controller - 2 $\mu$ C

The BLE-3 controller is suitable for Brushless AC and DC motors up to 20kW. Double microcontroller redundant architecture. Single or double CAN interface.



### Technical details

#### Power section

Power supply: 36/48V 72/80V 96V 120V

Maximum current:

- BLE-3 36/48V: 600 Arms (2')
- BLE-3 80V: 450 Arms (2')
- BLE-3 PW 36-48V: 650 Arms (2')
- BLE-3 PW 72/80V: 550 Arms (2')

Ambient temperature range: -40° +40°C

Maximum heatsink temperature: 85°C (starts to reduce current)

#### Mechanics

Dimensions: 200x230x103 mm

Connector: Ampseal 23 poles (2 x 23 poles in premium version)

Protection: IP65

Available with Al base plate or finned heatsink

#### I/O Premium version

10 Digital inputs

5 Analog inputs

7 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface

1 Analog input: Motor Temperature Sensor

1 Sin/Cos Interface, 3 Digital Hall Sensors Interface (with reduction of digital input number)

#### Other features

CAN-BUS Interface (2 lines in Premium version)

## BLE-4 Controller - 2 $\mu$ C

The BLE-4 Controller is suitable for counterbalanced trucks up to 8 tons, Tow Tractors and Airport Ground Support Vehicles, Aerial (telescopic boom and scissor lift) access equipment, fitted with Brushless AC and DC motors up to 20kW. Double microcontroller redundant architecture.

Available both in standard or expanded I/O (premium).

### Technical details

#### Power section

Power supply: 36V 48V 80V 96V 120V

Maximum current:

- 36V 1000 Arms (2') - 48V 875 Arms (2')
- 80V 700 Arms (2') - 96V 500 Arms (2')
- 120V 400 Arms (2')

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 85 °C (starts to reduce current)

#### Mechanics

Dimensions: 204 x 235 x 103 mm

Connector: Ampseal 23 poles (35 poles for Premium version)

Protection: IP65

Available with Al base plate or with fitted heatsink

#### I/O

5 Digital Inputs (input range - Batt ÷ + Batt )

2 Analog inputs (input range 0 ÷ 12V )

2 Outputs driving to - Batt: pwm or ON/OFF, voltage controlled

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface, 3 Digital Hall Sensors Interface (with reduction of digital input number)

1 Analog input: Motor Temperature Sensor

#### I/O Premium

11 Digital Inputs (input range - Batt ÷ + Batt )

4 Analog inputs (input range 0 ÷ 12V )

6 Outputs driving to - Batt:

1 Output driving to - Batt: Proportional EV, current controlled

1 Incremental Encoder Interface, 1 Sin/Cos Interface, 3 Digital Hall Sensors Interface (with reduction of digital input number)

#### Other features

Flash memory embedded

CAN-BUS Interface

## BLE-5 Controller - 2 $\mu$ C

The BLE-5 controller is suitable for Brushless AC and DC motors up to 30kW. Double microcontroller redundant safety architecture.



### Technical details

#### Power section

Power supply: 48V 72V 80V 96V 120V

Maximum current:

- 48V 1000 Arms (3')
- 72V 1000 Arms (3') - 80V 1000 Arms (3')
- 96V 800 Arms (3') - 120V 750 Arms (3')

Continuous output power:

48V 18000W - 80V 30000W

Ambient Temperature range: -40° +40° C

Maximum heatsink temperature: 75°C (starts to reduce current)

#### Mechanics

Dimensions: 370x300x144 mm

Connector: Ampseal

Protection: IP65

Available with Al base plate or fitted heatsink

#### I/O

8 Digital inputs (input range - Batt ÷ + Batt )

2 Analog inputs (input range 0 ÷ 12V )

1 Analog input: Motor Temperature Sensor

1 Sin/Cos interface

1 Incremental Encoder Interface, 1 Sin/Cos Interface, 3 Digital Hall Sensors Interface (with reduction of digital input number)

2 Outputs driving to - Batt

#### Other features

CAN-BUS Interface

Serial Interface

# ZAPI Technology

## Electronic power steering

The electronic power steering unit provides CB trucks, reach trucks, order pickers, man-up VNA trucks and similar vehicles with a “steer by wire” system. ZAPI offers the system controller, stepper motor (tacho-generator) and the motor/gearbox combination for a complete, integrated solution.

The electronic power steering with wire guidance controls the steering for vehicles operating in narrow aisles. Vehicle mounted sensors (Smart antenna) detect the magnetic field from a cable embedded in the floor, and guide the vehicle, without steering input from the operator. ZAPI offers a system that will operate in a wide range of current and frequencies in the cable (from 30mA AC up to 100mA AC at frequencies of 5.2, 6.25, 7, 9.1, 10 KHz). All electronic power steering comply with ISO EN 13849-1 CAT. 3 PL.D.

### EPS AC0 AMPSEAL

This is a compact and cost effective steer by wire controller for trucks fitted with AC steering motors (ACIM, BLAC). It is suitable for steering wheel, handlebar and tiller trucks. Microprocessor technology, combined with the CAN Bus communication system, provides an effortless steering command facility, with several advanced features:

- Steering sensitivity reduces when the truck speed increases.
- Truck speed reduces in proportion to the angle of the steered wheel.
- Force feedback device control with high and low side drivers.
- A non-linear relationship between the handle bar position and the steered wheel angle can be made.
- On request, the steering command may originate from a remote unit via CAN Bus.

### EPS AC0 AMPSEAL TORQUE ASSISTED

Same as EPS AC0 Ampseal but for torque assisted applications.



#### Technical details

Nominal voltage: 24V 36V 48V 72V 80V  
Maximum current:  
- 24V, 36V 85 Arms  
- 36V, 48V 70 Arms  
- 72V, 80V 40 Arms  
Dimensions: 120x150x55 mm  
CAN-BUS Interface  
Dual Microprocessors, both CAN Bus connected  
Environmental Protection: IP54 or IP65 (with Ampseal connector)



#### Technical details

Nominal voltage: 24V 36V 48V 72V 80V  
Maximum current (1'): 70A (50A@72V-80V)  
Dimensions: 150x210x74 mm  
CAN BUS (2 independent in WG version only)  
Dual Microprocessors  
Internal hour meter  
Environmental protection: IP54

### Smart antenna

The smart antenna is a microprocessor based unit, able to detect signal data for wire-guidance applications. It picks up the magnetic field from an embedded wire in the floor; amplifies the signal, and then transfers the information to the EPS-AC + WG through the dedicated CAN BUS communication system.



## EPS BLI - EPS ACW Integrated steering system

Integrated Plug & Play steering system available in CB (counterbalanced) and Warehouse configuration. The integration between the electronic controller and the steering mechanics permit an easier installation with associated cost reduction. Due to the dual microcontroller architecture both connected to CAN bus it fulfills the Category 3 PL.D of ISO EN 13849-1 also in applications with steering command via CAN bus.

### EPS BLI

- Wide range of command sensors (stepper motor, twin pot, double PWM, double encoder).
- Wire Guidance compatible.

#### Technical details

Nominal voltage: 24V 36V 48V 72V 80V  
Maximum current:  
- 24V, 36V 70 Arms  
- 36V, 48V 70 Arms  
- 72V, 80V 50 Arms  
CAN-BUS Interface  
Dual Microprocessors, both CAN Bus connected  
Environmental Protection: IP65



### EPS ACW Warehouse Version

- Wide range of command sensors (stepper motor, twin pot, double PWM, double encoder).
- Wire Guidance compatible.

#### Technical details

Nominal voltage: 24V 36V 48V 72V 80V  
Maximum current:  
- 24V, 36V 70 Arms  
- 36V, 48V 70 Arms  
- 72V, 80V 50 Arms  
CAN-BUS Interface  
Dual Microprocessors, both CAN Bus connected  
Environmental Protection: IP65



### EPS ACW CB Version

- Absolute and redundant contactless sensors onboard.
- High power saving compared to hydraulic version.
- Less noisy than hydraulic version.

#### Technical details

Nominal voltage: 24V 36V 48V 72V 80V  
Maximum current:  
- 24V, 36V 70 Arms  
- 36V, 48V 70 Arms  
- 72V, 80V 50 Arms  
CAN-BUS Interface  
Dual Microprocessors, both CAN Bus connected  
Environmental Protection: IP65



# ZAPI Technology

## Series motor controllers

The ZAPI family of series controllers are designed to perform with standard DC Series wound traction and pump motors. Microprocessor based, these controllers incorporate the latest in solid state Mosfet technology, high frequency switching, microprocessor logic, digital adjustment, and diagnostic and fault code storage.

### Traction controllers

MAIN MODELS	24V	36V	48V	80V	96V	120V
HO - 24	230A	230A				
H1DN 1Q		300A				
H2	600A		600A	600A	600A	600A
H3D			1000A	1000A	1000A	800A
B1S (Dual)	330+330A	330+330A	330+330A			
Combi C1	350+350A		350+350A			

\* other models available

### Pump Controllers

MAIN MODELS	24V	36V	48V	80V	96V
HP	350A	350A			
H2P				600A	600A
HP CAN	500A	500A	450A	500A	
HPRC	500A	500A	500A	500A	
PPC	500A		350A		

\* other models available

## HP Can Pump Controller

This equipment is suitable for operations on medium and large capacity trucks, such as counter balance, order picker, reach and 3 wheel trucks, with DC series wound motors from 2kW to 20kW.



### Technical details

#### Power section

Power supply: 24V 36V 48V 80V

Maximum current:

- (24V, 36V) 500 A DC

- (36V, 48V) 450 A DC

- (80V) 500 A DC

Ambient Temperature range: -40° +40°C

Maximum heatsink temperature: 75°C

(starts to reduce current)

#### Mechanics

Dimensions: 110x200x127 mm

Connector: Ampseal 35 poles

Protection: IP65

Available with Al base plate or finned heatsink

#### I/O

8 Digital inputs to + B

1 Digital input to - B

2 Analog inputs (input range 0 ÷ 12V )

1 Incremental encoder port

2 Outputs driving to - Batt:

1 Output for proportional EV, current control

2 Outputs driving to - Batt

(optional if the encoder is not used)

#### Other features

CAN-BUS Interface

Serial Interface

## Controllers for separately excited motors

After recognising the significant advantages of separately excited motors (SEM) for traction applications, ZAPI was the leader in developing this technology for industrial electrical vehicles. Since the start of production in the early 1990's, ZAPI has continued to improve the control algorithms and the design of the SEM family of controllers. Incorporating full bridge field control in all of the SEM models, ZAPI has not only eliminated the need for direction contactors, but also provides inherent features such as speed control and regenerative braking. All SEM controllers feature high frequency operation, microprocessor control, Mosfet power technology, digital adjustment, programmable logic, solid-state direction reversal, fault code storage, anti-roll down, anti-roll back, speed control, regenerative braking, hour meter and battery level sensing.

### Single Controllers

MAIN MODELS	24V	36V	48V	72V	80V	96V
SEM-X	110A	110A				
SEM-0	200A	200A				
SEM-1 C	300A	300A	330A			
SEM-1 CAN			400A			
SEM-2 D	500A	500A	350A	280A	280A	
SEM-3 D			350A		550A	550A

\* other models available

### Dual/Combi/Tri Controllers

MAIN MODELS	24V	36V	48V	80V	96V
DUAL SEM-0	200+200A	200+200A			
DUAL SEM-2	500+500A	350+350A	350+350A		
DUAL SEM-3				500+500A	500+500A
Combi SEM-0	150+150A	150+150A			
Combi SEM-1	400+300A		250+180A		
Combi SEM-2	500+350A	500+500A	350+350A		
Combi SEM-3			600+500A	500+500A	
TRIPLAT	250+250+250A		180+180+200A		
TRIPLO	330+330+350A		330+330+350A		

\* other models available

## Controllers for Permanent Magnet motors

The ZAPI family of PM motor controllers new release now include also the new Dual traction and Dual traction & HPpump versions developed from a well proven and reliable hardware architecture. All new released controllers are CAN based this permitting the use both as stand alone or with a can based on board vehicle controller.

### Single Controllers

MAIN MODELS	24V	36V	48V
4Q	90A	70A	50A
MX	90A	70A	
PMX	165A	140A	
PMX PW	240A	210A	
PMO	220A	180A	
PMO PW	320A	280A	

\* other models available

### Dual Controllers

MAIN MODELS	24V	36/48V
DUAL PMX	80+80A	70+70A
DUAL PMX PW	120+120A	105+105A
DUAL PMX &HP	80+80A+280A	70+70A+240A
DUAL PMX &HP PW	120+120A+280A	105+105A+240A
DUAL PMO	110+110A	90+90A
DUAL PMO PW	160+160A	140+140A
DUAL PMO &HP	110+110A+270A	90+90A+220A
DUAL PMO &HP PW	160+160A+270A	140+140A+220A

\* other models available

# ZAPI Technology

## Display

### Smart display

This electronic module is an intelligent operator interface. The display informs the operator of the truck status in real time (BDI, HCs, operating modes, fault control). The membrane keypad is an interactive interface for operators and service engineers to customise truck setups and calibrate truck sensors.



### Technical details

#### Power Supply

15-100V

#### Control

- 64 kbyte eeprom to record:
- operator adjustable parameters
- truck fault logs
- truck hour counters
- operator password
- service password
- maintenance features
- BDI profiles

#### Communication

- CAN
- RS232 - current loop only for handset and laptop

#### Display Alphanumeric

- 2 lines
- 20 characters each line
- backlight

#### Leds 6, red colour

#### Dashboard membrane, 6 buttons

#### Input

##### 8 DIGITAL

- Input range - Batt ÷ + Batt
- Input Impedance max 47 KOhm
- Threshold level 10 V

#### Output

2 ON-OFF NPN type 1,5 A

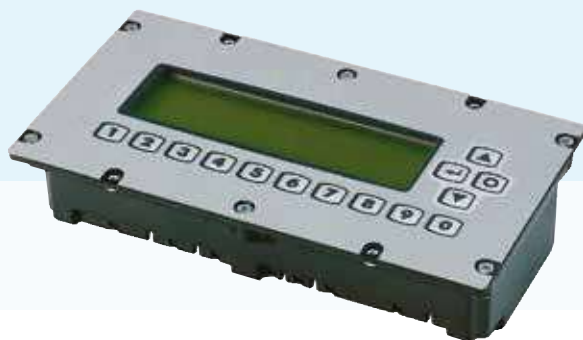
1 ON-OFF NPN type 100 mA

#### Connectors Ampseal

#### Protection IP65

### Sicos

This electronic module is an intelligent operator interface. The graphic display informs the operator of the truck status in real time (BDI, HCs, operating modes, fault control). The membrane keypad is an interactive interface for operators and service engineers to customise truck setups and calibrate truck sensors.



### Technical details

#### Input

##### 18 DIGITAL

- PNP Type VBatt
- Input Impedance 10 KOhm
- Threshold level 10V

##### 4 DIGITAL

- NPN Type +5
- Input Impedance 4,7 KOhm
- Threshold level Analogue Input

##### 5 ANALOGUE

- 0-5V
- Input Impedance > 100 KOhm

Normally used for finger tips

##### 3 ANALOGUE

- 0-7,5V
- Input Impedance > 100 KOhm

Normally used for potentiometer (traction, brake...)

#### Output

3 ON-OFF NPN type 500 mA - 48V

## Eco smart display

This electronic module is an intelligent operator interface. The display informs the operator of the truck status in real time (BDI, HCs, operating modes, fault control). The Navipad is the interactive interface for operators and service engineers to interact with truck, setup and calibrate truck sensors.



### Technical details

**Power Supply**

15-100V

**Control**

- operator adjustable parameters
- truck fault logs
- truck hour counters
- operator password
- service password
- maintenance features
- BDI profiles

**Communication**

- CAN-BUS Interface

**Display**

- Graphic LCD
- 128x64 pixel resolution
- backlight

**Leds** 5, red colour

**Dashboard** 5 buttons Navipad

**Connectors** Minifit with rubber protection

**Protection** IP65

## Graphic smart display

This electronic module is an intelligent operator interface similar to ECO SMART but more important in dimension and with a larger view area. The graphic display informs the operator of the truck status in real time (BDI, HCs, operating modes, fault control). The 6 push buttons permit operators and service engineers truck interaction, setup and calibrate truck sensors.



### Technical details

**Power Supply**

24-80V

**Control**

- operator adjustable parameters
- truck fault logs
- truck hour counters
- operator password
- service password
- maintenance features
- BDI profiles

**Communication**

- CAN
- RS232 - current loop only for handset and laptop

**Display**

- Graphic LCD 70x46,50 mm view area
- 240x160 pixel resolution
- backlight

**Diagnostic Leds** 6, red colour

**Dashboard** 6 push buttons

**Connectors** Minifit with rubber protection

**Protection** IP54

**I/O**

- 4 Analog / Digital Inputs
- 1 Output driving to - Batt, 2,0A continuous
- Available with calendar function (optional)

## Multifunction Digital Indicator

This indicator provides three main functions: battery state of charge indication, hour meter count, and information on the alarm status of the system. The MDI PRC indicator incorporates all functions of the MDI. In addition it is able to drive two proportional valves and two ON/OFF valves. One unit provides single module indicator functions plus control of an electrohydraulic distributor.



### Technical details

**MDI Features:**

Supply voltage: 12V

Dimensions: Ø52x35 mm

**MDI CAN Features:**

Supply voltage: 12V

Dimensions: Ø52x63 mm

CAN-BUS Interface

Backlighted

**MDI PRC Features:**

Supply voltage: 12V

Dimensions: Ø52x63 mm

2 outputs for proportional valves: 2A continuous (current control)

2 outputs for ON/OFF valves: 2A continuous (PWM control)

# ZAPI Technology

## Hydraulic Valves Controller

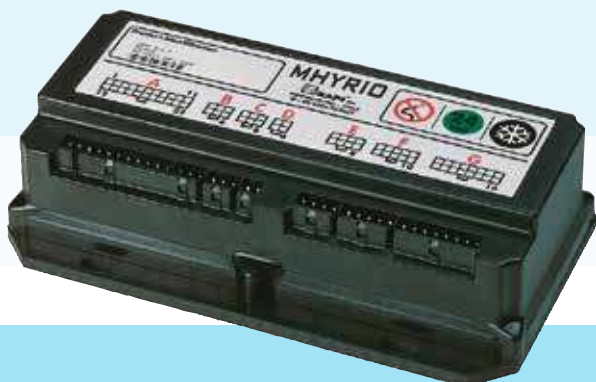
### Mhyrio CB

Mhyrio CB is an electronic module specifically designed for the control of hydraulic electrovalves. Typically it is one of the nodes in an intelligent distribution system in which different modules are connected together via CAN Bus. The Mhyrio CB unit has the advantage that it can easily be located near to the actuators (hydraulic valves) thus reducing and optimising wiring layout.



### Mhyrio flash

Mhyrio flash is an electronic module specifically designed to control hydraulic electrovalves. Typically it is one of the nodes in an intelligent distribution system in which different modules are connected together via CAN Bus. The Mhyrio flash unit has the advantage that it can easily be located near to the actuators (hydraulic valves) thus reducing and optimising wiring layout.



#### Technical details

**Power Supply** 15-100V

**Control**

- eeprom to record operator adjustable control parameters

**Communication**

- CAN
- RS232 - current loop only for handset and laptop

**Input**

3 DIGITAL

- Voltage range VBatt
- Input Impedance max 47 KOhm
- Threshold level 6V

1 ANALOGUE

- 0-10V, 3 wires
- Input Impedance > 100 KOhm

**Output**

3 ON-OFF NPN 1,5 A

9 PROPORTIONAL 1,5 A

- EVP 1-2 function 1
- EVP 3-4 function 2
- EVP 5-6 function 3
- EVP 7-8 function 4
- EVP 9 function 5

**Dimension** 82x197x59 mm

**Connector** Ampseal

**Protection** IP65

#### Technical details

**Power Supply** 15-56V

**Control**

- eeprom to record operator adjustable control parameters

**Communication**

- CAN
- RS232 - current loop only for handset and laptop

**Input**

8 DIGITAL

- PNP Type VBatt
- Input Impedance 10 KOhm
- Threshold level 6V

2 ANALOGUE

- 0-10V, 3 wires
- Input Impedance > 100 KOhm

**Encoder**

- A and B 12V
- PNP or NPN type open collector or push-pull
- Threshold 2,5V
- Max Frequency 500 Hz
- Supply 12 V < 50 mA

**Output**

3 ON-OFF NPN 1,5 A

8 PROPORTIONAL 1,5 A

- EVP 1-2 function 1
- EVP 3-4 function 2
- EVP 5-6 function 3
- EVP 7-8 function 4

Function 3 and 4 are mutually exclusive

**Dimension** 125x215x55 mm

## HVC - Hydraulic valves control

HVC is an electronic module specifically designed to control hydraulic electrovalves. Typically it is one of the nodes in an intelligent distribution system in which different modules are connected together via CAN Bus. The HVC unit has the advantage that it can easily be located near to the actuators (hydraulic valves) thus reducing and optimising wiring layout.

### Technical details

#### Power Supply

12-24V

#### Control

- eeprom to record operator adjustable control parameters

#### Communication

- CAN
- RS232 - current loop only for handset and laptop

#### Input

##### 3 DIGITAL

- Voltage range VBatt
- Input Impedance max 10 KOhm
- Threshold level 7V

##### 2 DIGITAL

- 0-12 Volt
- Input Impedance 10 KOhm

##### 1 ANALOGUE

- 0-10V
- Input Impedance > 100 KOhm

#### Output

4 ON-OFF NPN 1,5 A

1 PROPORTIONAL NPN 0-1,5 A

**Dimension** 82x107x47 mm



## ZAPI VCM - Vehicle Control Master

The VCM family is a group of I/O and valve controls also including the vehicle control software capability. Depending on final application requirements different sets of I/O are available. Also available in double micro and/or double CAN architecture.

### General Characteristics

Power supply: 24V 36V 48V 72V 80V  
Dimensions: 225 x 90 x 49 mm  
Connector: Ampseal 35 poles (35 + 23 poles in double connector version)  
Protection: IP65  
Real Time Clock  
Built-in freewheeling diodes  
Ambient temperature range: -40° +40°C

#### I/O

7 Digital inputs  
2 Analog inputs  
2 Outputs driving to - Batt:  
8 Outputs driving to - BATT proportional EV, current controlled  
2 CAN-BUS Interfaces  
+12V Output Power Supply (up to 500mA)  
+5V Output Power Supply (up to 150mA)

#### Other features

Serial Interface

#### I/O double connector version

11 Digital input  
10 Analog inputs  
3 Outputs driving to - Batt:  
9 Outputs driving to - BATT proportional EV, current controlled  
2 Incremental Encoder Interface  
2 CAN-BUS Interfaces  
+12V Output Power Supply (up to 500mA)  
+5V Output power Supply (up to 150mA)



# ZAPI Technology

## Accessories

### Smart console

With this console it is possible to interact with the controller via CAN or Serial communication in order to monitor the real time operation and to change the software parameters in order to better fit the application. The console onboard USB port permits also to import/export controller operational data using an external flash drive.

In addition to this Smart Console, other ZAPI tools are available, either serial or CAN based, permitting to operate on controllers using external devices such as personal computers.



### Can tiller & Can encoder

Designed to collect inputs and make data available via CAN Bus, CAN Tiller and CAN Encoder are essential to minimize wiring layout.



### Technical details

3.2" TFT Color Display  
ARM Cortex 32bit Microcontroller  
Connection via CAN or serial line (compatibility mode)  
Power supply from truck battery (24V to 80V) or from onboard NiMh AA batteries  
Improved Navigation and Tester Menu  
Interchangeable cable  
3 user programmable buttons  
USB connection to flash drives  
Dimension: 100x190x60 mm

### Man-machine interface details

#### Tester

Real time display of the analogue and digital measurements in the controllers (battery voltage, motor voltage, motor current, temperature, potentiometer voltage, ...).

#### Programming Parameters

Multilevel password protected access to the controllers parameters.

#### Save&Restore

Possibility to save in an external memory a set of parameters in order to program multiple controllers with the same set in an automated way.

#### Alarms display

last 5 faults/warnings.

#### Advanced functions

CAN messages real time data-logging on USB for system analysis  
Real time data-logging of I/O values shown in the tester menu  
Sw download for firmware upgrade.

### Technical details

#### I/O - CAN TILLER

12 Digital inputs (input range: - Batt + + Batt)  
6 Analog inputs (input range: 0 + 12V)  
Analog inputs can be used also as Digital inputs  
Command devices supply 5V or 12V

#### I/O - CAN ENCODER

2 Encoder inputs  
6 Analog inputs (input range: 0 + 12V)  
Analog inputs can be used also as Digital inputs  
Command devices supply 5V or 12V

#### OTHER FEATURES

CAN Bus interface  
Sw download via CAN Bus  
Potted version available on request

## Topo foot pedals

These units are complete with cable, connector, and one or two pedals. A sensor provides a variable output voltage according to pedal angle. Microswitches for forward, reverse and bypass are also fitted.

### Technical details

**Dimension**  
(levers included) 115x160x195 mm



## Joystick and fingertip

ZAPI philosophy is, and always has been, to co-operate with the customer for the development of every kind of electric vehicle. Our technical consultation is well appreciated by most of the world's important electric vehicle manufacturers. Joystick and Fingertip control elements are becoming more and more strategic components for ZAPI. We can provide the most advanced joysticks currently present in the international market. As a result of our strong experience in material handling, boom lift, scissors lift, and crane markets, ZAPI is able to give technical consultation on the most sophisticated joysticks. ZAPI co-operates with high profile joystick manufacturers such as Penny & Giles, Gessmann, and ITT Cannon. ZAPI Technical Department is able to develop specific solutions for any customer requirement.



