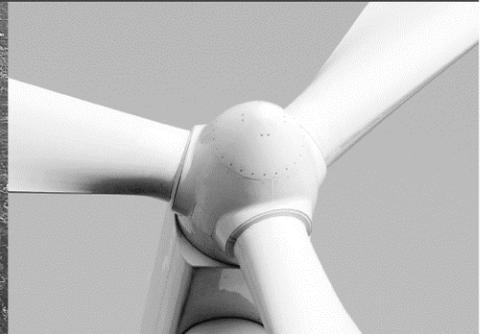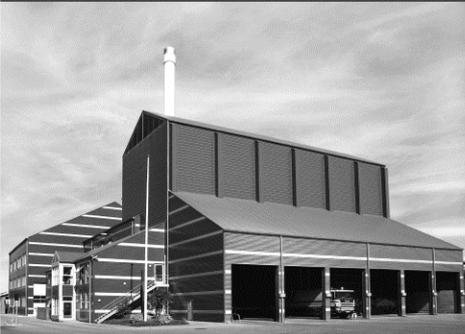# DEIF

- power in control

$C \in$

Electronic potentiometer EPQ96-2
DATA SHEET

Function

- Replaces normal motor potentiometers

Adjustment

- Integrating time (like variable gearboxes)
- Output start value
- Output end value
- Output value after power up
- Last value after power up

Extra functions included

- PWM output for speed control
- PWM output for speed droop settings
- J 1939 to analogue converter

Modes

- Manual/auto switch

Housing

- Flush mounting 96 x 96

Technology

The EPQ96-2 is an electronic unit to replace normal motor potentiometers. It contains no movable parts and is thus maintenance-free. The EPQ96-2 is CE-marked for residential, commercial and light industry plus industrial environment.

Application/function

The EPQ96-2 converts the relay output from a PI controller to a control voltage/current or PWM signal as input for the electronic speed governor. In case of supply voltage drop-out, the potentiometer is automatically preset according to the adjusted preset value or preset to the value before supply drop-out after reconnection of the supply voltage. The output is based on a 20 mA current generator shunted internally by means of a 500 Ω resistor, resulting in the output signals shown below. The EPQ96-2 is equipped with two push-buttons on the front for settings between manual or auto mode.

Automatic control:
The speed is controlled by signals fed via relay contacts, e.g. by the DEIF synchroniser type FAS-113DG/115DG or the load sharing units type LSU-112DG/113DG/114DG.

Manual control:
The speed is controlled by activating two push-buttons on the front of the unit after the EPQ96-2 is set to manual mode.

Adjustments

Integrating time:
To be set within the range: 2.5...25 s (set to "x1") or 12.5...125 s (set to "x5") by means of a switch and a potentiometer "time" located on the rear.

Output:
To be set within the range: 0...±10V DC, 0…±20 mA DC. ±10V is set by means of a jumper mounted on the terminals.

Start/end value: the start value and the end value can be adjusted inside the output span to any value between 20% span and up to 100% span by means of two potentiometers "min", "max" located on the rear of the unit.

Preset:
The output value after a reset or after a power-up can be adjusted by means of a potentiometer "preset" located on the rear to any value inside the selected output span.

Last:
By means of the switch on the rear, the start value after a power-up can be the output value just before a power-down, the actual output value is kept in memory and the output is reloaded after power-up.

Push-buttons

The EPQ96-2 has two push-buttons for selection of auto/man mode and two push-buttons for up/down control.

Indicators

The EPQ96-2 is equipped with two yellow LEDs located on the front. The LEDs are located in conjunction with the manual up and down push-buttons. The LEDs are on when the respective control inputs are active or if the push-buttons for up and down is activated in manual mode. When the output is integrated to max value, the respective LED is flashing.

The EPQ96-2 is also equipped with two yellow LEDs for indicating the auto or manual mode and a yellow LED flashing when a CAN telegram is received and one green LED for indication of power on. If the unit fails, this green LED is flashing one time per second, and the status relay is deactivated.

Inputs

The EPQ96-2 has input for preset, up, down. All inputs can be controlled by 18…32V DC as input.

Special input

The EPQ96-2 has a J1939 input (CAN). This input can convert a standard TSC1 telegram into an analogue or a PWM signal. This input is specially intended for interfacing our AGC 200 to an engine equipped with an analogue governor.

Digital outputs

The EPQ96-2 has a relay output for indication of auto mode. The relay contact is closed in auto mode, configured ND, and a status relay output for indication of correct function. The status output is closed when the unit is working, configured NE. Besides this, the EPQ96-2 also has a built-in relay that will disconnect the electronic circuit and only keep the 500 ohm shunt resistor connected to output terminals. This relay is deactivated if the supply voltage is interrupted or if the EPQ96-2 fails, this function will ensure local control of the engine.

Analogue outputs

The EPQ96-2 has one analogue output that can operate in the range -10…0…10 V or -20…0…20 mA; the output impedance is 500 ohm. Besides this, the EPQ96-2 also has a PWM output giving a PWM signal of 0…6 V 500 Hz. This output is controlled in auto/manual mode similar to the analogue output. The EPQ96-2 also has a fixed PWM output giving a signal from 0…6V DC 500 Hz. This output is set by means of a potentiometer "PWM duty", located on the rear.

Power up functions

The output after a power-up can be the adjusted preset value or the output value before a power-down (last mode).

The setting preset/last is done by means of a switch located on the rear. After a power-up, the EPQ96-2 will always automatically be set to auto.

Supply

The EPQ96-2 can be supplied from 9…31.2V DC. The unit will operate down to 5 V.

Housing

96 x 96 in front, cut-out 92 x 92.

PWM output

The EPQ96-2 has two PWM outputs for use together with e.g. a Caterpillar governor.

Both outputs are a 500 Hz 6 V PWM signal. One output is proportional to the up/down control. The outputs are based on an open collector with a 1 k pull-up resistor connected to an internal 6V DC supply. The below table shows the relationship between the analogue output and the PWM output.

Analogue output V	PWM output
-10 V (-20 mA)	0% Duty cycle
-8 V (-16 mA)	10%
-6 V (-12 mA)	20%
-4 V (-8 mA)	30%
-2 V (-4 mA)	40%
0 V (0 mA)	50%
2 V (4 mA)	60%
4 V (8 mA)	70%
6 V (12 mA)	80%
8 V (16 mA)	90%
10 V (20 mA)	100%

The other output is intended for adjusting the speed droop settings on e.g. a Caterpillar governor. The output is adjustable by means of a potentiometer, "PWM duty", located on the rear of the unit. The setting is only done once during commissioning. Note that the two PWM outputs are not galvanically separated, and they have a common terminal for the PWM return.
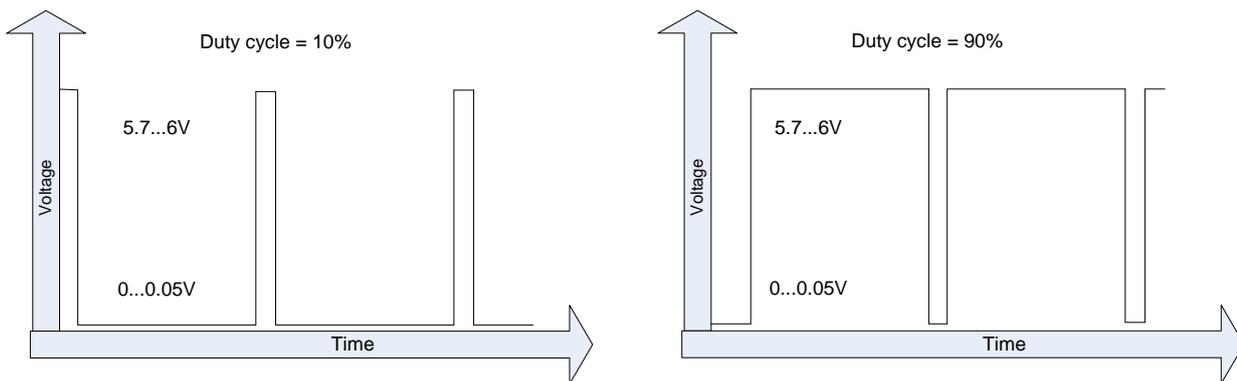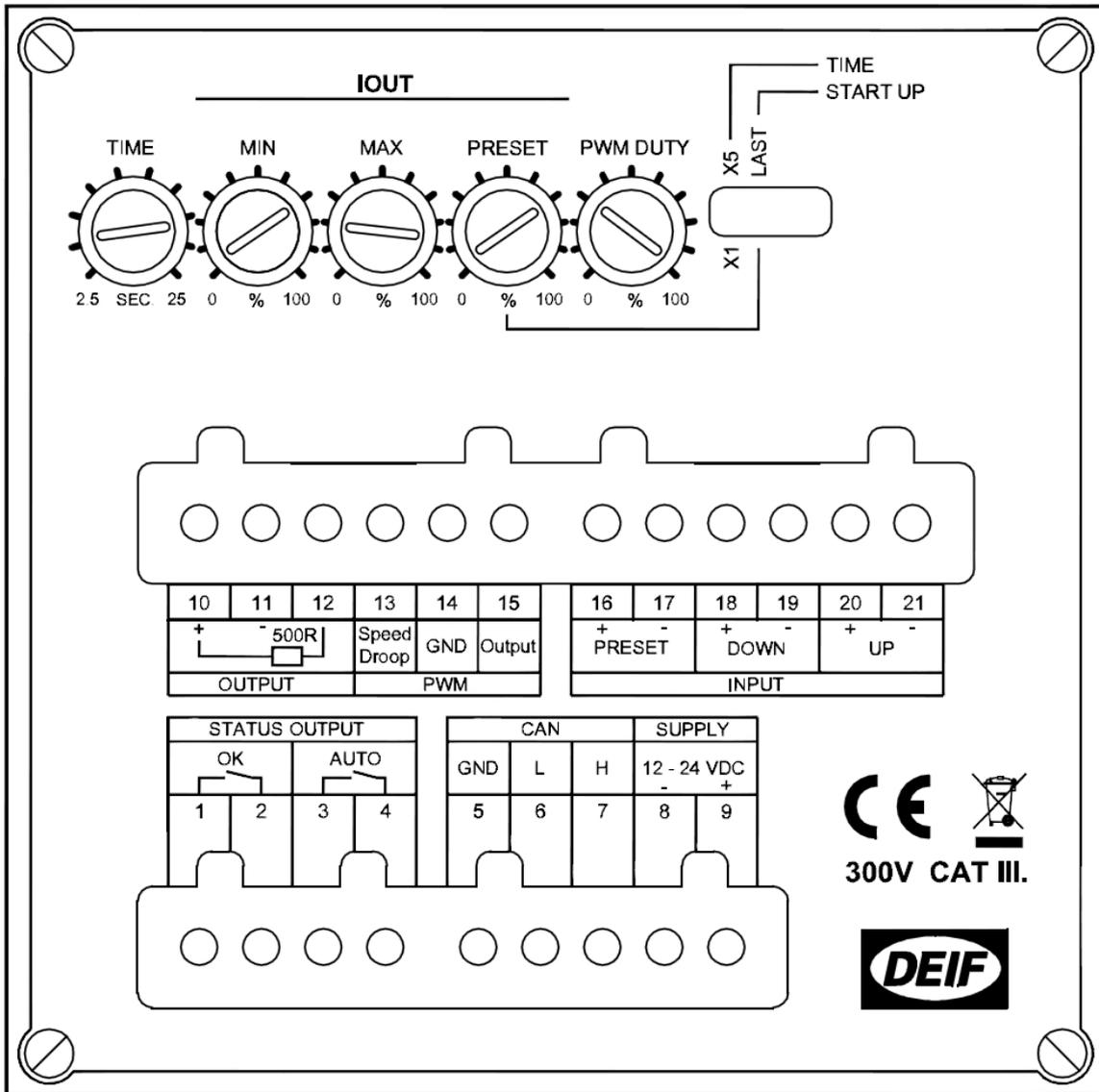

CAN Interface

The EPQ96-2 can be used for converting a CAN J1939 telegram into an analogue voltage signal, current signal or a PWM signal. The EPQ96-2 will automatically recognise the CAN telegram and adjust the settings according to the CAN data.

The EPQ96-2 has input for CAN J1939, so the output value can be controlled from a CAN unit. The min. and max, potentiometers are still active in the CAN mode, the CAN input is then able to control the output inside the set min. max. value. The integrating time is still adjusted by means of the potentiometer located on the EPQ96-2. The CAN input is equipped with a LED, located close to the CAN input, this LED is activated when a telegram is received.
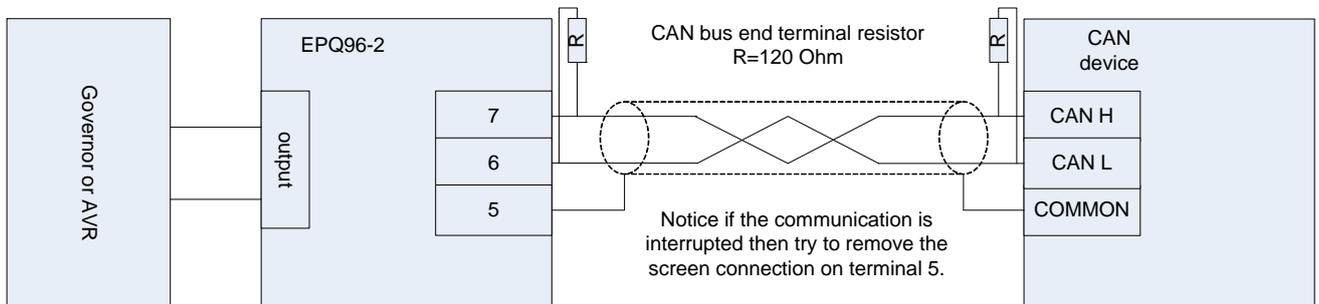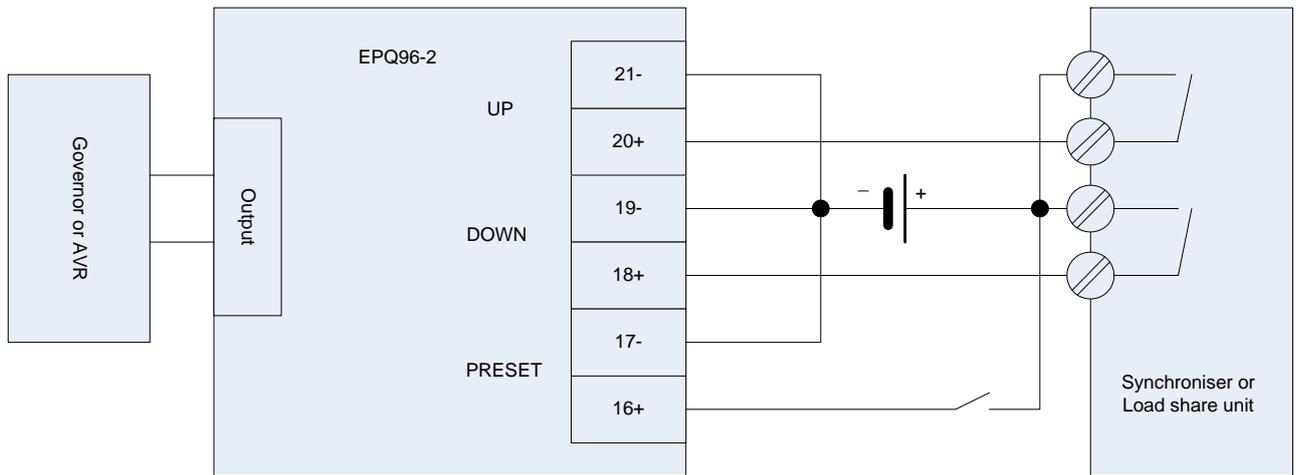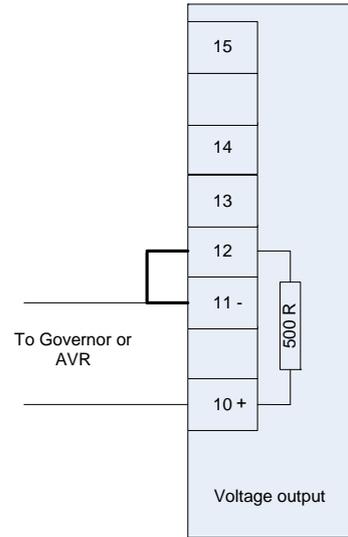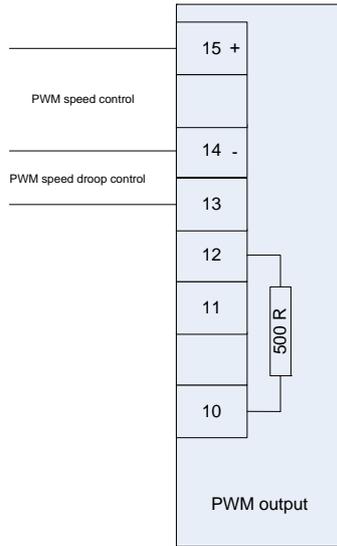
If adjustment is done when the EPQ96-2 was in manual mode, the settings will be available on the CAN port, this is done to make sure that a change from manual mode to auto mode will not result in a jump in speed of the engine.

Using the above feature, the EPQ96-2 is also able to convert the CAN telegram so an analogue AVR can be controlled, In this case, two EPQ96-2 has to be used; one for governor control and one for AVR control. The EPQ96-2 is by means of the switch located to the right of the switch marked "start up" configured for governor or AVR control. If the switch is set, the EPQ96-2 is configured for AVR control.

Terminals and settings

Connection diagrams

Current output

15	
14	
13	
12	500 R
11 -	
10 +	

PWM output

PWM speed control

PWM speed droop control

15 +	
14 -	
13	
12	500 R
11	
10	

Voltage output

To Governor or AVR

15	
14	
13	
12	500 R
11 -	
10 +	

EPQ96-2

Governor or AVR — Output

UP	21-
	20+
DOWN	19-
	18+
PRESET	17-
	16+

Synchroniser or Load share unit

EPQ96-2

Governor or AVR — output

7	
6	
5	

R — CAN bus end terminal resistor R=120 Ohm — R

CAN device

CAN H
CAN L
COMMON

Notice if the communication is interrupted then try to remove the screen connection on terminal 5.

Technical specifications

Supply voltage	12…24V DC -25%/+30% (9…31.2 V) Load dump protected according to IEC 7637-2
Output voltage	0…±10V DC output impedance 500 Ω
Output current	0…±20 mA DC R load max. 500 Ω
Start/end value adjustment	-/+10 V or -/+20 mA, min span value is 10% e.g. 2 V or 4 mA (10% of 20 V or 40 mA)
Preset value adjustment	Between the start and end output value
Integrating time (2 ranges)	2.5...25 s or 12.5...125 s (linear ramp time from -10 V to 10 V or -20 mA to 20 mA) note 1
Accuracy of setpoint setting	±20% of potentiometer full scale
Resolution settings	10 bit
Accuracy reproduction	±0.5%
Ripple	2.5 mV RMS or 5uA RMS
Resolution	2.5 mV or 5uA RMS (13 bit)
Response time	<0.1 s
PWM output	0…6V DC 500 Hz ±50 Hz
PWM output	Low level 0…0.05 V; high level 5.7…6 V
PWM resolution	10.000 step (>13 bit)
PWM response time	<0.1 s
Input: preset, up, down	Voltage 9…31.2V DC current consumption 10 mA at 24 V, all inputs are mutually galvanically separated.
Output contact: auto/man	Auto mode equal to closed contact. Max load 30V AC/30V DC and 50 mA
Output contact: status	OK mode equal to closed contact. Max load 30V AC/30V DC and 50 mA
Temperature	-10...55°C (nominal), -25...70°C (operating), -40...70°C (storage)
Galvanic separation	Between supply voltage and remaining circuits: 500 V - 50 Hz - 1 min. and between status output and remaining circuits, and between CAN input and remaining circuits. None between input/output
Safety	300 V Cat. III Pollution degree 2 according to IEC 61010-1
Climate	IEC 60068-2-30
EMC	To IEC 61000-6-1, 61000-6-2, 61000-6-3, 61000-6-4, 60255-22-1
Materials	Self-extinguishing plastic (polycarbonate), to UL94 (V0)
Terminals	Screw terminals: 2.5 mm^2 (multi-stranded), 4 mm^2 (single-stranded), CAN + status outputs 1 mm^2.
Protection	IP52 (panel front), IP20 (panel rear). To IEC and EN 60529
Note 1	The slope is independent of the adjusted span; e.g. if the integrating time is adjusted to 20 s with a span of 0…10 V, if the span is readjusted to e.g. 0…5 V, the integrating time from 0…5 V will now be 10 s.

Unit dimensions in mm
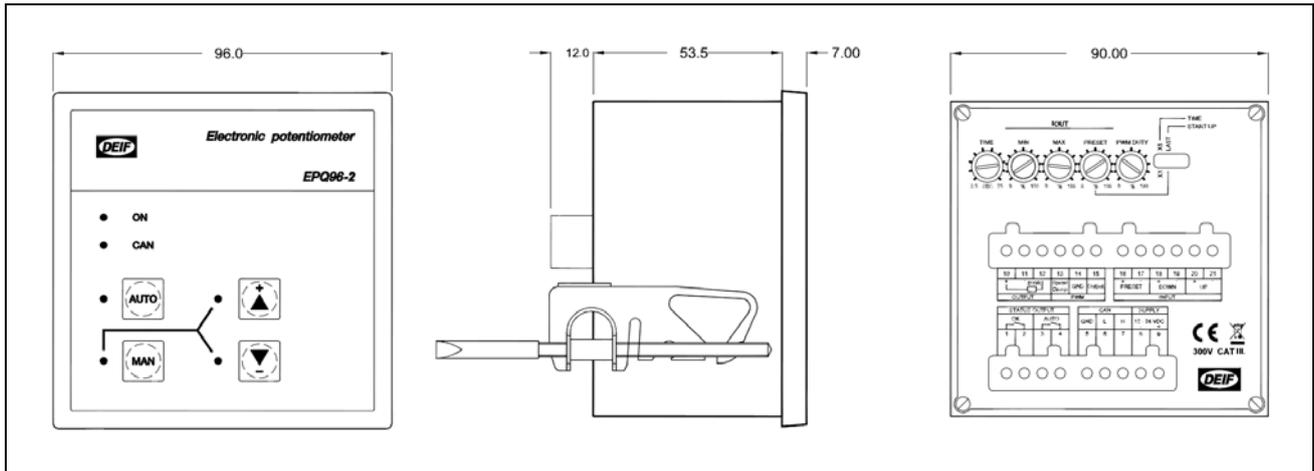
Order specifications

Variants:

Mandatory information		
Item no.	**Type**	**Variant no.**

Example:

Mandatory information		
Item no.	**Type**	**Variant no.**
2913870010-01	EPQ96-2	01