

### DESCRIPTION

The electronic regulator MDE-V90 can control two Sauer-Danfoss pumps series 90 with option KA or KP.

The input signals can come from two 1kOhm potentiometers supplied directly by +5V regulator output (or by supply voltage in ratiometric version).

To verify the interruption of a wire or the a potentiometer failure it is recommended to connect, in series to each potentiometer, two resistors, each with a value of about 10% of the potentiometer's value to limit the range of the command signal between 0.5V and 4.5V.

MDE-V90 regulator can also control directly an optional safety valve (dump valve) every time a pump is activated.

The two channels for the two pumps, in the "double" version, are completely independent (except the ENABLE signal which is the same for both pumps).



### INPUTS

- n° 2 analog input, 2.5V in rest position, with range from 0V÷ 5V (recommended 0.5V ÷ 4.5V with range control); or range 25%-50%-75% of supply voltage (ratiometric version - Danfoss signal).

- n° 1 ON/OFF input to enable outputs (unique for the two pumps).

### OUTPUTS

- n° 2 couples of 200Hz PWM outputs to command the two proportional coils of the pump series 90;

- n° 1 ON/OFF output for an optional DUMP VALVE, supplied when at least one pump is activated;

- n° 1 +5V stabilized output to supply potentiometers (maximum output current = 50 mA).

### MAIN FEATURES

- Independent minimum and maximum currents calibration for each PWM output signal;

- The validity of analog input signal range, dead band and useful programmable range can be controlled to ensure a greater safety during the operations;

- A power output for the dump valve is activated every time a proportional output is switched on (for this output is possible to set a switch off delay to prevent pressure peaks on the hydraulic circuit);

- Two LEDs provide informations on the operativity of the regulator and help in troubleshooting indicating the fault type with a fixed number of flashes;

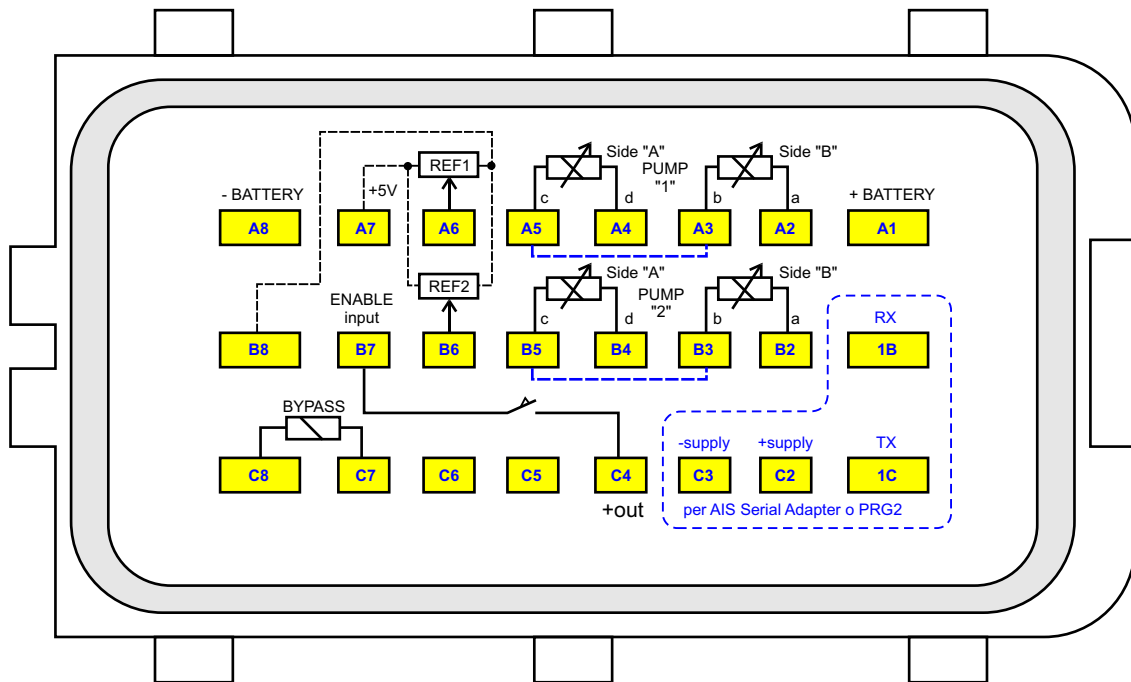
- Unique supply voltage from 10 to 30 Vdc;

- 24 pins fast socket connector IP68;

- A serial port with proprietary protocol can be used for calibration using a programming keyboard PRG2 (only current calibration) or a Personal Computer (with special serial adapter AIS and Sepsim Windows® software) for complete control of operational parameters;

- a "single" version of the regulator is also available to command a single pump.

## CONNECTIONS



male connector 24 pins (view from side pin)

NOTE: in case of Single Pump, please use PUMP 1 connections.

NOTE: A3 and A5 for Pump1, and B3 and B5 for Pump 2, are internally connected together

## TECHNICAL CHARACTERISTICS

Supply voltage	10Vdc ÷ 30Vdc
Max current absorption	60 mA + output load
Supply for external potentiometers	+5V - maximum current 50 mA
Working ambient temperature	from -20 to +60 °C
PWM minimum current regulation range	from 9 to 103 mA
PWM maximum current regulation range	from 10 to 103 mA
Max current to the pump	limited to 250 mA
Max dump valve current output	2.5 A
Reference input signal (5V range)	2,5V rest position +/- 2.0V (0.5V ÷ 4.5V) or +/- 2.5V
Reference input signal (ratiometric)	50% Vsupply rest position +/- 25% of Vsupply
Input signal limit range (5V range)	Enabled (limit 0.25V and 4.75V) - can be disabled
Input impedance (5V range/ratiometric)	11 kOhm towards 2.5V / 80 kOhm towards GND
Overall dimensions (+ connector)	130 x 110 (+37) x 38 mm
Drilling interaxis	119 x 99 mm (n° 4 screws M5)
Protection degree	IP68
Weight	490 g

## **WORKING MODE**

When you turn on the device, the control unit checks all analog inputs signals.

The signals must be inside the CALIBRATION BAND, which is +/- 45% of setted DEADBAND. The analog signal acquired in turning on mode will be taken as zero position value for the working mode, to compensate a little calibration errors of joysticks and to use all their electrical stroke.

## **LED SIGNALS**

The red and the green LEDs on the electronic card are used to show different working conditions.

In normal operating conditions, the red LED is used as a power supply LED; it is turned on when the power supply is present. Also, the red LED is turned off for a little while when bypass output is turned on or off.

In case of faulty operations the red LED flashes in various modes, depending on the fault type.

### **RED LED**

**One flash:** system turned on with a reference signal out of DEADBAND. The corresponding output will stay turned off. It is necessary to turn off the electronic card and turn on it again with reference signals at zero.

**Two Flashes:** a reference input signal has overcome the LIMIT THRESHOLD. The corresponding output will stay turned off. It is necessary to turn off the electronic card and turn on it again. This control can be enabled/disabled.

**Three Flashes:** excessive current erogation error; it is not possible to command Sauer-Danfoss series 90 pumps with a current over a certain limit, so the device performs this additional check. It is necessary to turn off the electronic card and turn on it again with reference signals at zero.

**Four Flashes:** Closed relay contact error. The relay contact is find closed before the command signal is given. To reset: switch off and turn on the control unit. If error persist, the control unit has to be replaced.

**Five Flashes:** Open relay contact error. The relay contact can not close: probably relay's coil is damaged. To reset: switch off and turn on the control unit. If error persist, the control unit has to be replaced.

### **GREEN LED**

In normal working mode, the green LED is turned on proportionally to the greatest PWM output current. If output cables are not connected, the green LED remains off because no current is supplied to the solenoids.

In programming mode, the green LED is normally turned off and is turned on only when the current parameter value is equal to 0.

## **PROGRAMMING MODE**

To adjust working parameters, it is necessary to plug the PRG2 programming keyboard into the appropriate connector that is inside the rubber bellow of main connector.

### **Adjustable parameters:**

The number of flashes of the programming keyboard LED indicates the programming step in which you are. As PRG2 is connected You are in step no. 1.

By the pressure of "PREV" and "NEXT" push buttons you are able to navigate through the programming steps; otherwise, by the pressure of "+" "-" push buttons you are able to increase and decrease the parameter corresponding to the actual programming step.

At the end of the programming procedure, you have to push "PREV" and "NEXT" push buttons at the same time to save in memory the new parameters value. If You do not give the SAVE command all modification will be loose when the device is turned off.

During memory saving, the PRG2 LED stops flashing for some seconds; please wait until the end of the saving before turning off the device.

## PROGRAMMABLE PARAMETERS with PRG2

Step 1: Minimum current Pump 1: output current when the signal overcomes deadband, from 0 to 100%.

Step 2: Maximum current Pump 1: output current when the signal's stroke ends, from 0 to 100%.

Step 3: Minimum current Pump 2: output current when the signal overcomes deadband, from 0 to 100%.

Step 4: Maximum current Pump 2: output current when the signal's stroke ends, from 0 to 100%.

Step 5: Check Limit Enable / Disable

Step 6: calibration of the correction factor for the current command, to compensate auto-induction effect on the Danfoss pumps (0 = no correction, 10 = standard correction; 15 = maximum correction).

During the programming mode, the device continues to work normally to give you a real time feedback of the changes done.

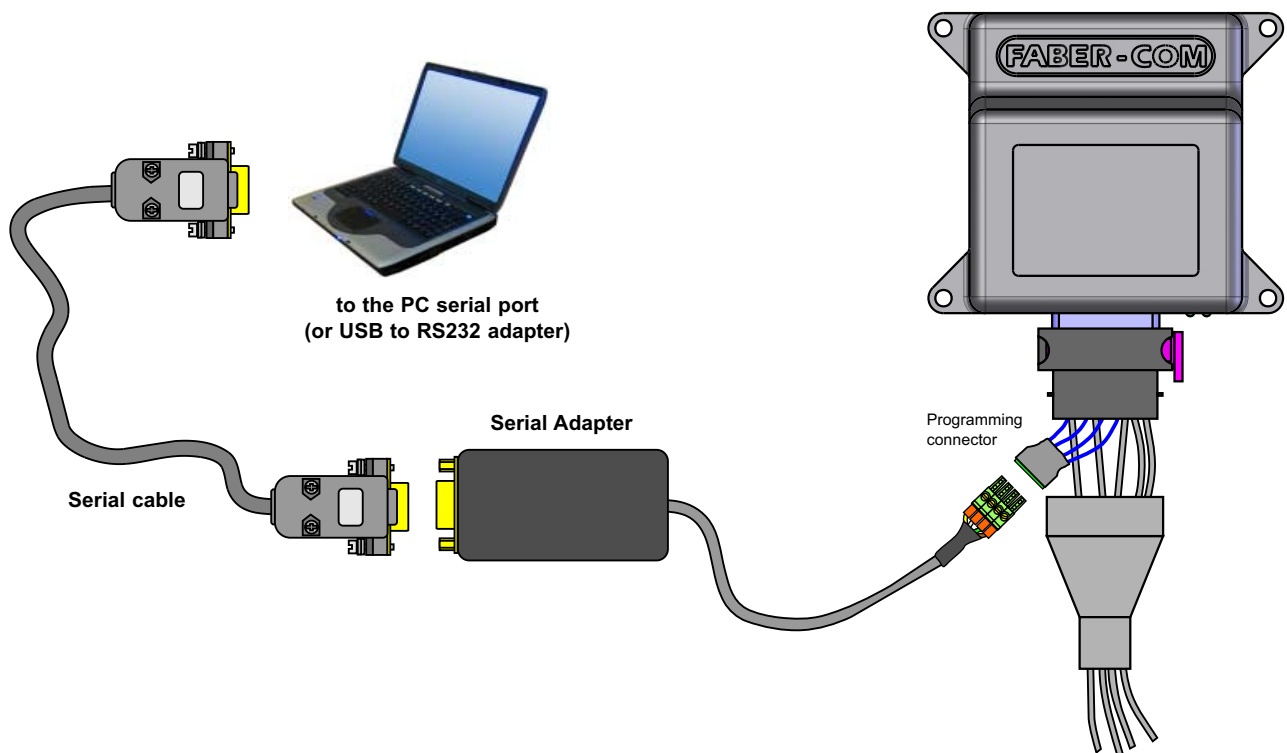
When you are in programming step number 5, press a couple of times the "-" button to disable check limit (green led on); otherwise, press a couple of times the "+" button to enable check limit (green led off).

## ADJUSTING PARAMETERS by Personal Computer with serial adapter

Connect the serial adapter to the connector that is inside the rubber bellow of main connector. Supply the system and then run the SepSim program on the PC. Load the suitable configuration file.

Follow SepSim instruction manual to modify parameters.

### EXAMPLE OF CONNECTION TO PERSONAL COMPUTER BY SERIAL ADAPTER



### PC INTERFACE PROGRAM MAIN PAGE

Please modify only the parameters in the table below:

CFG	Tipo	Vis.	Lato_A	Lato_B	Descrizione			
0	0	0	W	d	0	0	0	I min % pump 1
1	100	100	W	d	100	100	0	I max % pump 1
2	0	0	W	d	0	0	0	I min % pump 2
3	100	100	W	d	100	100	0	I max % pump 2
4	0	0	W	d	0	0	0	Ramp up pump 1
5	0	0	W	d	0	0	0	Ramp down pump 1
6	0	0	W	d	0	0	0	Ramp up pump 2
7	0	0	W	d	0	0	0	Ramp down pump 2
8	10	W	D			10		Bypass Delay
9	7	W	D			7		RESERVED
10	00000011	W	B			00000011		Global Config
11	10	W	D			10		Perc K Correction (10 = 100%)
12	10	W	D			10		Dead Band
13	50	W	D			50		Signal Stroke
14	10	W	D			10		Limit Threshold
15	2000	W	D			2000		RESERVED
16	300	W	D			300		RESERVED
17	1	W	D			1		RESERVED
18	9	W	D			9		RESERVED
19	103	W	D			103		RESERVED
20	100	W	D			100		RESERVED
21	0	R	D			7003		Firmware Version

**ATTENTION:**  
do not modify "RESERVED" parameters  
**PERMANENT DAMAGE can occur**

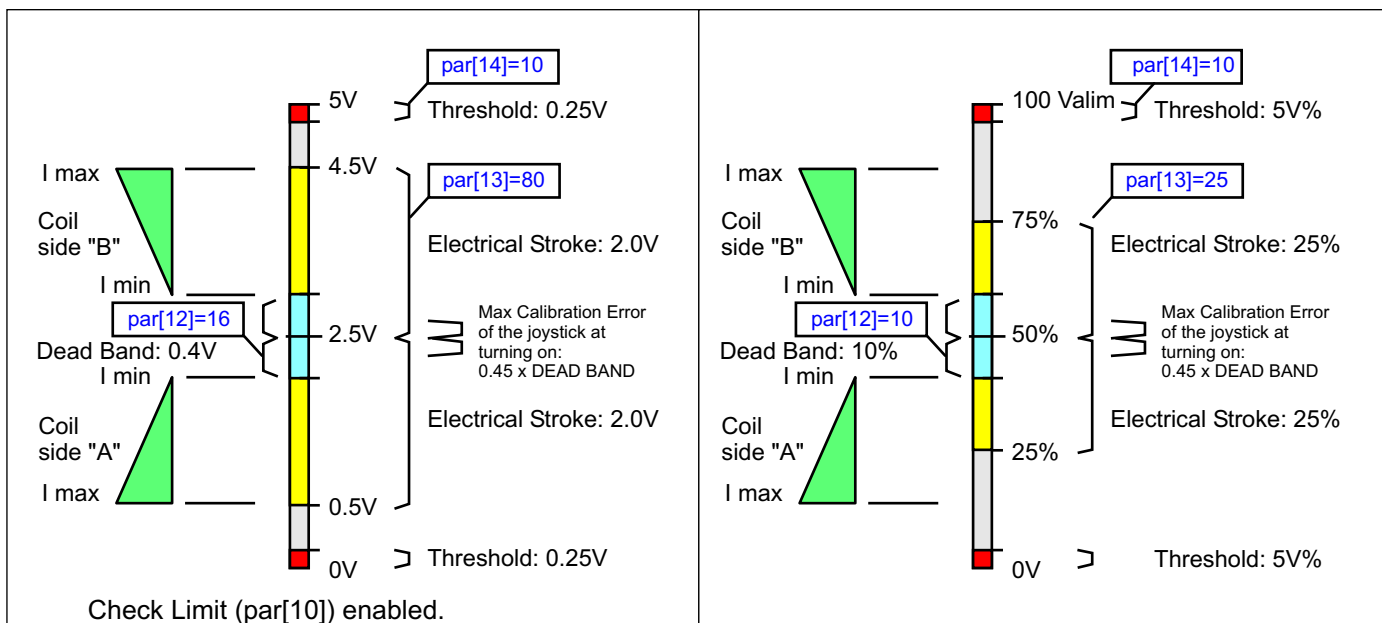
Min and Max current parameter value are expressed in percentage of the full range:  
 - 0 % = pump closed (= 9 mA)  
 - 100 % = pump fully open (= 103 mA)

Time ramps are expressed in 0.1 second/unit (e.g.: 4 → 4 \* 0.1 = 0.4 secondi).

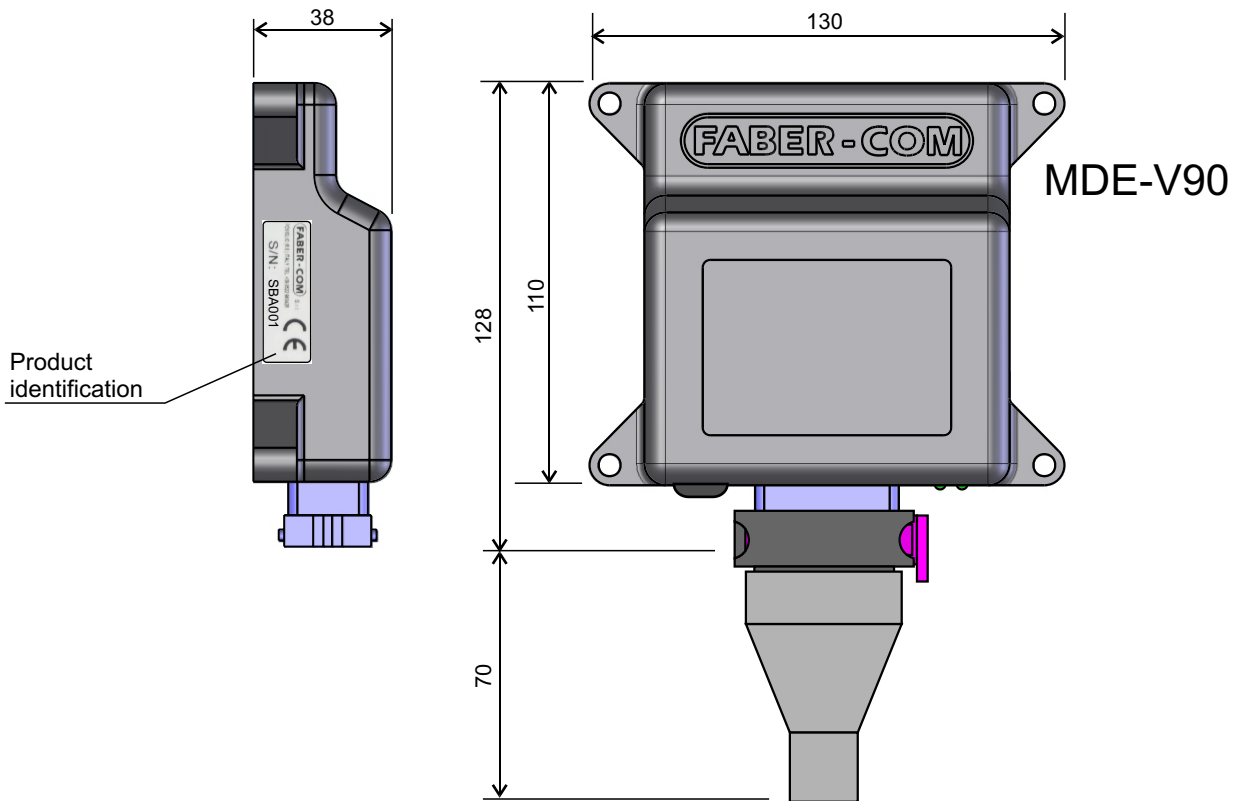
#### PRESETTED VALUES

Standard Input Range

Danfoss Input Range



## SIZES



## ORDERING CODES

Pwm regulator MDE-V90 (connector NOT included):

Code: **PSCH55** \_

- **R** - ratiometric input signal version 25%-50%-75% (Danfoss)
- **S** - for single pump
- **D** - for two pumps

24 pins flying female connector kit with crimping contacts, caps, rubber protection and programming connector

Code: **PCVF241**

Serial programming keyboard PRG2

Code: **PPRG2**

Serial interface adapter (AIS) for communication with PC (software Sepsim for Windows® included)

Code: **PISP**