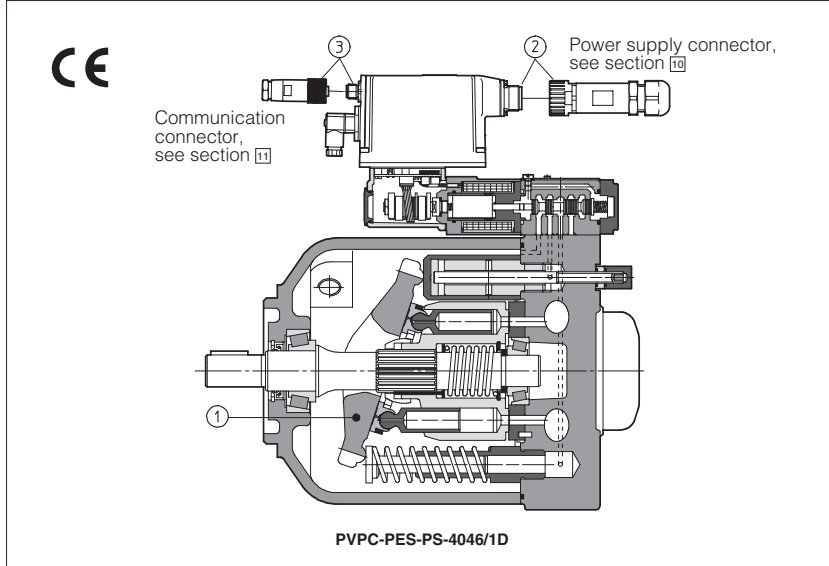


Integral electronic drivers type E-RI-PES

digital, for variable displacement axial piston pumps with P/Q control



These digital drivers are integral to the Atos variable displacement axial piston pumps type PVPC. They control in closed loop the pump swashplate position ① and the system pressure according to the electronic reference signals realizing a P/Q regulation.

Features

- Integral digital electronics, factory preset
- Software setting of the main functional parameters as zero regulation, scale, ramps, by means of the relevant programming devices KIT-E-SW-*, see section 8.
- Possibility to optimize the application performances modifying via software internal parameters as the dynamic response (P.I.D.) and the regulation characteristics of the pump flow and pressure (linearization)
- Possibility of real time selection of different pressure PID parameters set during the axis motion, options /S and /Z.

Following communication interfaces ③ are available:

- -PS, RS232 serial communication interface. The pump reference signals are provided with analog commands via the 12 pin connector ②
 - -BC, CANbus interface
 - -BP, PROFIBUS-DP interface
- In the -BC and -BP executions the pump reference signal are provided via fielbus; during start up or maintenance, the pump can be operated with analog signals via the 12 pin connector ②.
- IP67 protection degree.
 - CE marking grants the conformity to the EMC Directive (Electromagnetic Compatibility).

1 MODEL CODE

E-RI - PE S - PS - 01H / * ** / *

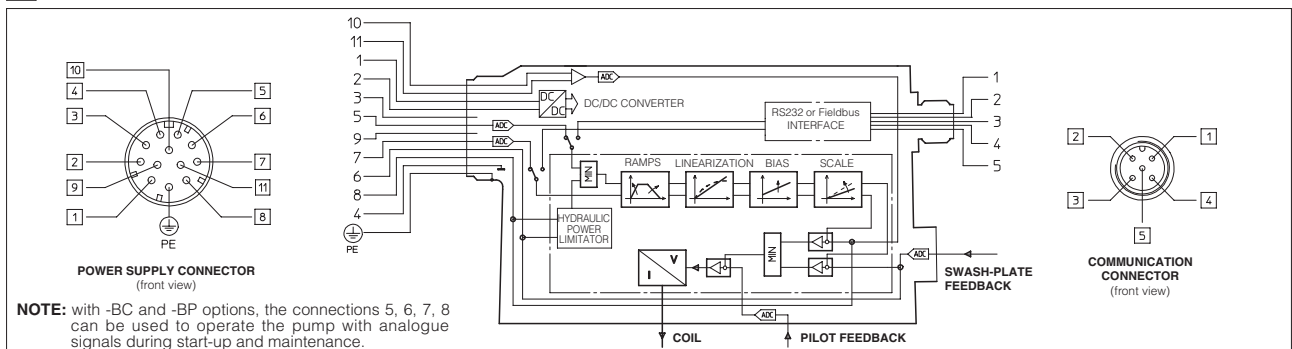
Integral electronic driver					Set code
PE = PVPC pumps with P/Q control					Series number
S = digital electronic					
Communication interfaces					
PS = RS232 serial					
BC = CAN-Bus					
BP = PROFIBUS-DP					
01H = for single solenoid proportional valves					

Options, see section 4

- = standard version
- C** = with remote current transducer
- S** = with multiple PID parameters set - **only for -PS**
- X** = with pressure transducer integral to the pump
- Z** = as **S** but with double power supply, enable and fault - **only for -BC and -BP**

Note: the set code identifies the correspondance between the digital integral driver and the relevant pump

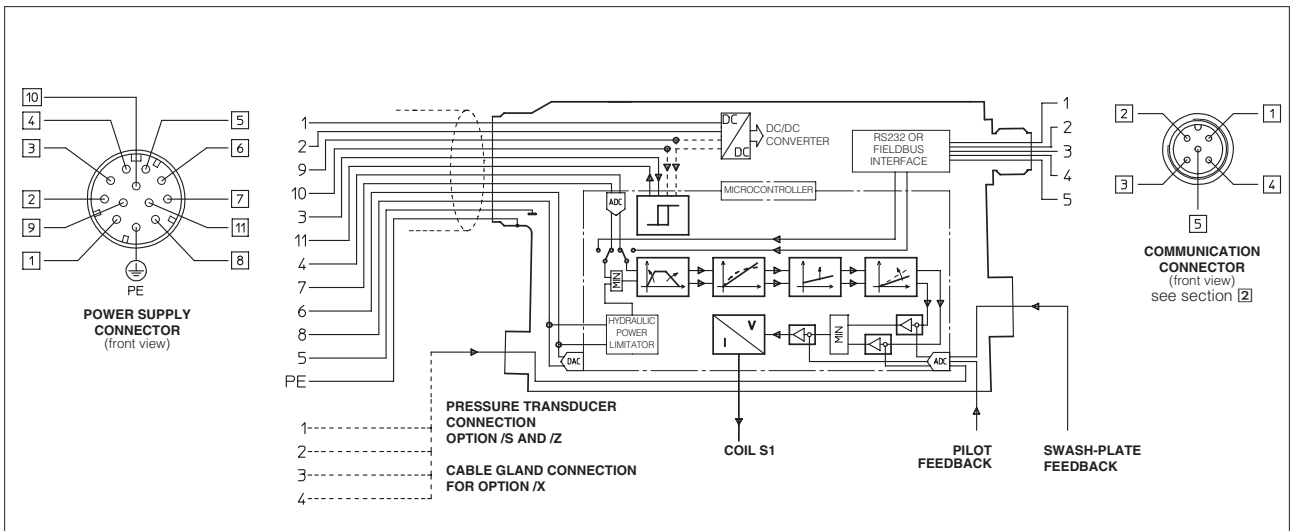
2 ELECTRONIC AND WIRING BLOCK DIAGRAM FOR -PES (1)



POWER SUPPLY CONNECTOR			COMMUNICATION CONNECTOR				
PIN	DESCRIPTION SIGNAL	SIGNAL	Communication option	-PS (RS232) Male connector	-BC (CAN Bus) Male connector	-BP (PROFIBUS-DP) Female connector (reverse key)	
1	power supply 24 V _{dc}	Stabilized: +24 V _{dc}	PIN number - Signal description	1	CAN_SHLD	+5V Termination voltage	
2	power supply zero	Filtered-rectified: Vrms 21-33 (ripple max 2 Vpp)		2	NC	NC	LINE -A Bus line (high signal)
3	Fault	Alarm = 0 V _{dc} Correct functioning = +24 V _{dc}		3	RS_GND Signal zero data line	CAN_GND Signal zero data line	DGND Signal zero data line / termination voltage
4	Signal zero	Reference 0 V _{dc}		4	RS_RX valves receiving data line	CAN_H Bus line (high signal)	LINE-B Bus line (low signal)
5	Flow input signal	0 ÷ 10 V _{dc} (referred to pin 4)		5	RS_TX valves transmitting data line	CAN_L Bus line (low signal)	SHIELD Shield
6	Flow monitor	0 ÷ 10 V _{dc} (referred to pin 4)					
7	Pressure input signal	0 ÷ 10 V _{dc} (referred to pin 4)					
8	Pressure monitor	0 ÷ 10 V _{dc} (referred to pin 4)					
9	Power limitation enable	> 9 to +24 V _{dc}					
10	Pressure feedback + V _{dc}	0 ÷ 10 V _{dc} pressure feedback, 4 ÷ 20 mA with option /C,					
11	Pressure feedback 0	not connected with option /X					
PE	Earth	Connect only with supply not conforming to VDE 0551 (CEI 16/6)					

(1) for options /S and /Z, see section 3

3 ELECTRONIC AND WIRING BLOCK DIAGRAM FOR -PES/S and -PES/Z



POWER SUPPLY CONNECTOR (OPTION /S) only for /PS			POWER SUPPLY CONNECTOR (OPTION /Z) only for /BC and /BP		
PIN	SIGNAL DESCRIPTION	TECHNICAL SPECIFICATION	PIN	SIGNAL DESCRIPTION	TECHNICAL SPECIFICATION
1	Power supply 24 Vdc (power stage)	Stabilized: +24 Vdc	1	Power supply 24 Vdc (power stage)	Stabilized: +24 Vdc
2	Power supply 0 Vdc (power stage)	Filtered and rectified: Vrms 21-33 (ripple max 2 Vpp)	2	Power supply 0 Vdc (power stage)	Filtered and rectified: Vrms 21-33 (ripple max 2 Vpp)
3	Enable	Enabling input normal working 24 Vdc	3	Enable	Enabling input normal working 24 Vdc
4	Flow input signal	$\pm 10 \text{ Vdc} - 0 \div 10 \text{ Vdc}$	4	Flow input signal	$\pm 10 \text{ Vdc} - 0 \div 10 \text{ Vdc}$
5	Signal zero	Reference 0 Vdc	5	Signal zero	Reference 0 Vdc
6	Flow monitor	$\pm 10 \text{ Vdc}$ referred to pin 5	6	Flow monitor	$\pm 10 \text{ Vdc}$ referred to pin 5
7	Pressure input signal	$\pm 10 \text{ Vdc} - 0 \div 10 \text{ Vdc}$	7	Pressure input signal	$\pm 10 \text{ Vdc} - 0 \div 10 \text{ Vdc}$
8	Pressure monitor	$\pm 10 \text{ Vdc}$ referred to pin 5	8	Pressure monitor	$\pm 10 \text{ Vdc}$ referred to pin 5
9	PID selection	Zero or +24 Vdc	9	Power supply 24 Vdc (logic stage)	Stabilized: +24 Vdc
10	(see section 4.3)		10	Power supply 0 Vdc (logic stage)	Filtered and rectified: Vrms 21-33 (ripple max 2 Vpp)
11	Fault	Alarm = 0 Vdc Correct functioning = +24 Vdc	11	Fault	Alarm = 0 Vdc Correct functioning = +24 Vdc
PE	Earth	Connect only when the power supply is not conform to VDE 0551 (CEI 14/6)	PE	Earth	Connect only when the power supply is not conform to VDE 0551 (CEI 14/6)

4 OPTIONS

4.1 Option /X

Option providing the presence of the pressure transducer, with output signal $4 \div 20 \text{ mA}$, integral to the pump and factory wired to the PES electronics through a cable gland.

4.2 Option /C

The pump electronics is set to receive $4 \div 20 \text{ mA}$ feedback signal from the remote pressure transducer, instead of the standard $0 \div 10 \text{ V}$.

4.3 Option /S (only for /PS)

Option providing up to 4 set pressure of PID parameters real time selectable during the axis motion via on-off signals to the 12 pin connector to optimize the control performances in the different phases of the machine cycle. The selection of the pressure PID parameters set must be performed according the sequence, set 1 → set 2 → set 3 → set 4 and viceversa.

PID SET SELECTION				
PIN	SET 1	SET 2	SET 3	SET 4
9	0	0	24 Vdc	24 Vdc
10	0	24 Vdc	24 Vdc	0

4.4 Option /Z (only for /BC and /BP)

Option providing the same characteristics of option /S plus additional double power supply, enable and fault. The multiple set of pressure PID parameters can be real time selected during the axis motion through the -BC or -BP interfaces to optimize the control performances in the different phases of the machine cycle. The double power supply is specifically introduced for -BC and -BP fieldbus interfaces and it provides two separated power supplies for the digital electronic circuits and for the pilot valve power supply stage. It allows to interrupt the pump functioning by cutting the solenoid power supply of the pilot valve (e.g. for emergency, as provided by the European Norms EN954-1 for components with safety class 2), but keeping energized the digital electronic circuits, thus avoiding fault conditions of the machine fieldbus controller.

4.5 Pressure transducer connector (options /S and /Z)

The pressure transducer and the 4 pin connector type **SP-ZH-4P-M8/5** have to be ordered separately. See section 11 for the 4 pin connector and tab. G460 for the pressure transducer.

PIN	options /S and /Z	options /CS and /CZ (Ri = 316 Ω)	CONNECTOR (front view)
1	Pressure - real value	Pressure signal	
2	Common zero for power supply and signal	Reserved (do not connect)	
3	Transducer power supply +24 Vdc	Power supply	
4	Reserved (do not connect)	Reserved (do not connect)	

4.6 Current reference signal (option /I)

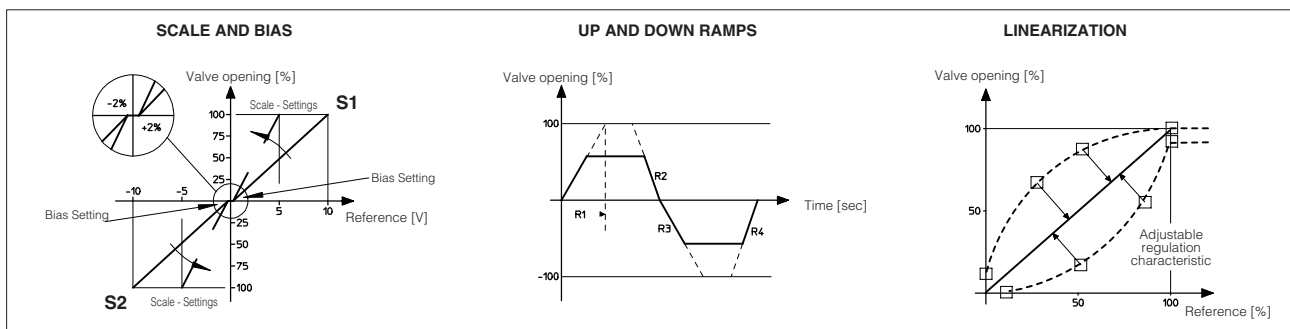
The digital drivers with option -PS can be supplied, **on request**, with $4 \div 20 \text{ mA}$ current reference signals and feedback signals, instead of the standard $0 \div 10 \text{ Vdc}$.

5 MAIN CHARACTERISTICS OF DIGITAL INTEGRAL ELECTRONIC DRIVERS

Driver section			
Format	Sealed box on the valve - Protection: IP67 DIN 40050 - Insulation: VDE0110		
Electromagnetic compatibility (EMC)	Emission: EN 50081-2 - Immunity: EN 50082-2		
Max power consumption	50 W		
Current supplied to solenoid	I _{max} = 3.3 A square wave PWM type		
Analog input signal impedance	Voltage signal R _i > 50 KΩ		
Operating temperature	-20°C ÷ +60°C (storage -20°C ÷ +70°C)		
Alarm messages	Electronic overcurrent and overtemperature		
Features	Pressure control by P.I.D. - Rapid solenoid excitation and switching off - Output to solenoids protected against accidental short circuits - Feedback cable break produces an inhibition of the driver, zeroing the current to the solenoid		
Communication options	RS232 interface (option -PS)	CAN-Bus interface (option -BC)	Profibus-DP interface (option -BP)
Serial input format	RS232C serial connection	Industrial field-bus with optical insulation type CAN-Bus ISO 11898	Industrial field-bus with optical type PROFIBUS - DP European fieldbus standard EN 50170 part 2
Communication Protocol	Atos protocol with ASCII coding	CANopen EN50325-4 Device Profile DS408	PROFIBUS - DP EN50170-2 IEC61158
Programming interface - see section 8	Software interface (see tab. G500)	Software interface (see tab. G500) or master CANbus device	Software interface (see tab. G500) or master PROFIBUS device

Note: A minimum time of 300 to 500 ms have be considered between the driver energizing with the 24 Vdc power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

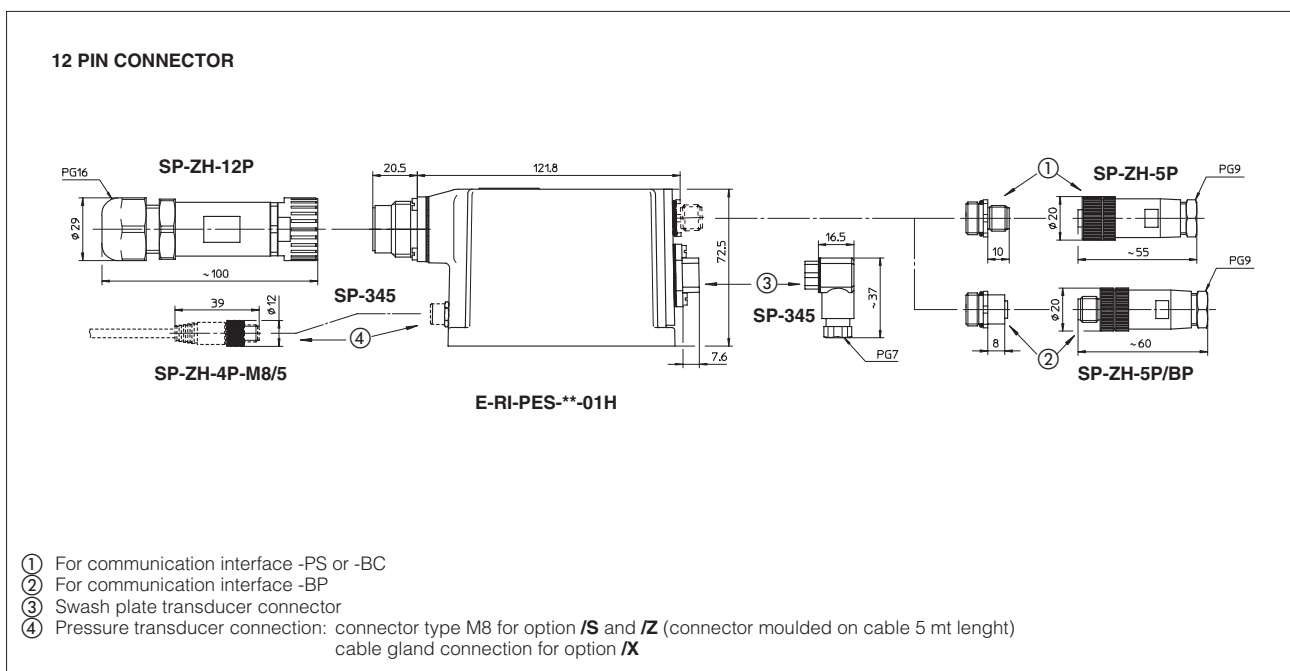
6 SOFTWARE SETTINGS



In addition to the above settings, other software regulations are available:

- Customized configuration of the reference signal, instead of standard ± 10V
- Internal self generation of the reference signal. This function is particularly useful during start-up or maintenance
- P.I.D. parameters setting to optimize at the pump dynamic control
- Alarm setting of the high/low limits of the electronics temperature
- Alarm setting of the control deviation (max difference between the reference signal and the regulation monitors after a selected time).
- Hydraulic power limitation

7 DIMENSIONS OF DIGITAL INTEGRAL ELECTRONIC DRIVERS AND CONNECTORS [mm]



8 PROGRAMMING DEVICES

The functional parameters of the digital pump, as the zero, scale, ramp and linearization of the regulation characteristic, can be easily set and optimized with graphic interface by using the following software programming devices suitable for standard PC:

KIT-E-SW-PS for electronics with RS232 interface (option **-PS**)

KIT-E-SW-BC for electronics with CANbus interface (option **-BC**)

KIT-E-SW-BP for electronics with PROFIBUS-DP interface (option **-BP**)

see tab. G500 for complete information about the programming device kits and for the PC minimum requirements.

Only for the -BC and -BP communication options, the functional parameters can be alternatively set via fieldbus through the machine control unit, using the standard communication protocols implemented by Atos.

The protocol operating instructions to be implemented in the standard protocols (DS301V4.02, DSP408 for CANbus and DPVO for PROFIBUS-DP) are described in the user manuals MAN-S-BC (for -BC option) and MAN-S-BP (for -BP option) supplied with the relevant programming device kits.

The above programming devices have to be ordered separately.

9 FIELDBUS FEATURES

9.1 CANbus - CANopen features implemented in Atos protocol

Protocol	CANopen version DS301 V4.02
Network error ctrl	Node Guarding
Boot up process	Minimum boot-up
Node ID, Baudrate	setting via LSS (Layer Setting Services) and via SDO
Number of RPDO	Four Receive PDOs (mappable parameters, default as indicated in DSP408)
Number of TPDO	Four Transmit PDOs (mappable parameters, default as indicated in DSP408)
Number of SDO	One Receive SDO and one Transmit SDO
Device Profile	DSP408 Device Profile Fluid Power Technology
Configuration	Physical Layer: ISO11898 (transmission rates from 10 Kbit/s to 1 Mbit/s) Data Link Layer: Based on CAN standard frame with 11-bit identifier (CAN 2.0A)
Info (file)	EDS file (Electronic Device Data Sheet) enclosed in KIT-E-SW-BC or DVD-E-MAN-BC (both in DVD format)

9.2 Profibus DP features implemented in Atos protocol

Protocol	Profibus version DPV0
Error control	SAP 60
Boot up proces	SAP 61, SAP 62
Node ID	SAP 55 or dip-switches hardware
Cyclic and Acyclic communication	PPO Telegrams: Type 5 for real-time and parameter communication (string management is realized with an Atos algorithm, see KIT-MAN-S-BP).
Device profile	PROFIBUS Profile: Fluid Power Technology
Configuration	Physical Layer: (lev.1 - EN50170 part. 2) rates from 9,6 Kbit/s to 12 Mbit/s, up to 126 stations (with repeaters) Data Link Layer: (lev.2 - EN50170 part 3/4)
Info (file)	GSD file (Electronic Device Data Sheet) enclosed in KIT-E-SW-BP or DVD-E-MAN-BP (both in DVD format)

10 CHARACTERISTICS OF POWER SUPPLY CONNECTORS (to be ordered separately)

CONNECTOR TYPE	POWER SUPPLY CONNECTOR
CODE	SP-ZH-12P
Type	Female straight circular socket plug 12 pin
Material	Plastic reinforced with fiber glass
Cable gland	PG16
Cable	LiCY 10 x 0,14 mm ² (signal) LiYY 3 x 1 mm ² (alimentation)
Connection type	to crimp
Standard	DIN 43651
Protection (DIN 40050)	IP 65

11 CHARACTERISTICS OF COMMUNICATION AND OF PRESSURE TRANSDUCER CONNECTORS (to be ordered separately)

CONNECTOR TYPE	RS232 CONNECTOR (-PS) or CAN-Bus (-BC)	PROFIBUS CONNECTOR (-BP)	PRESSURE TRANSDUCER CONNECTOR OPTIONS /S AND /Z
CODE	SP-ZH-5P	SP-ZH-5P/BP	SP-ZH-4P-M8 (1)
Type	Female straight circular socket plug 5 pin	Male straight circular socket plug 5 pin	Male straight circular socket plug 4 pin
Material	Plastic	Plastic	Plastic
Cable gland	PG9	PG9	(1)
Cable	for -BC: CANBus Standard (301 DSP) for -PS: LiYCY 5 x 0,25 shielded	PROFIBUS Standard	4x0,25 mm ²
Connection type	screw terminal	screw terminal	to solder
Standard	M12 – IEC 60947-5-2	M12 – IEC 60947-5-2	M8 – IEC 60947-5-2
Protection (DIN 40050)	IP 67	IP 67	IP 67

(1) Connector moulded on cable with 5 mt lenght)