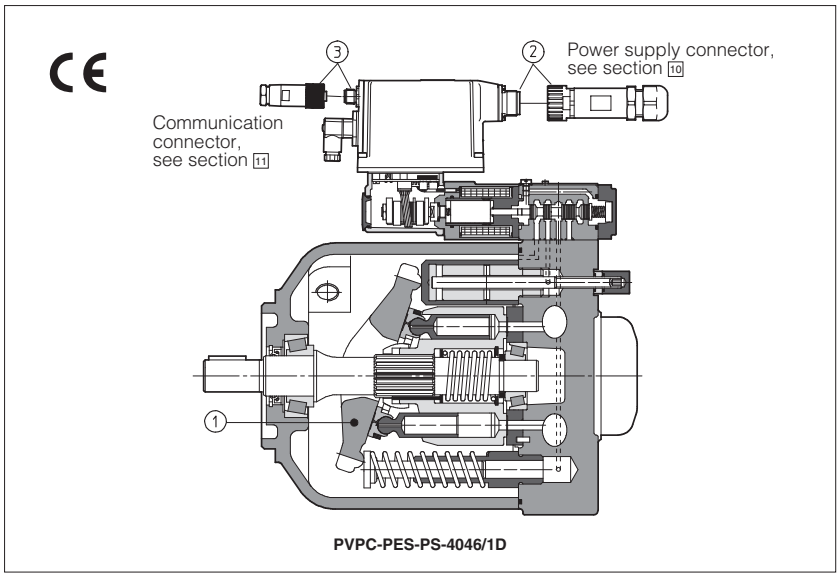
Integral electronic drivers type E-RI-PES

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 E-SW programming software, 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.

Following communication interfaces ③ are available:

- -PS, Serial programming interface
- -BC, CANopen programming interface
- -BP, PROFIBUS DP programming interface

The pump reference signals are provided with analog commands via the 12 pin connector ②

In the -BC and -BP executions the pump reference signal can be 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).

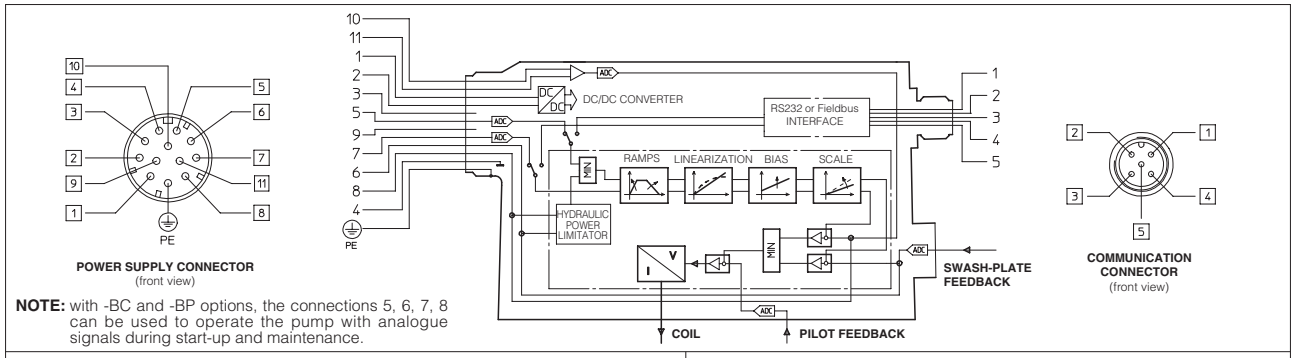
1 MODEL CODE

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

- **E-RI** — Integral electronic driver
- **PE** = PVPC pumps with P/Q control
- **S** = digital electronic
- Communication interfaces
  PS = Serial programming interface
  BC = CANopen programming interface
  BP = PROFIBUS DP progamming interface
- **01H** = for single solenoid proportional valves
- Series number
- Set code
- **Options, see section 4**
  - = standard version
  C = with remote current transducer
  I = current reference inputs and monitors (4÷20 mA)
  S = with multiple PID parameters set
  X = with pressure transducer integral to the pump

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

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



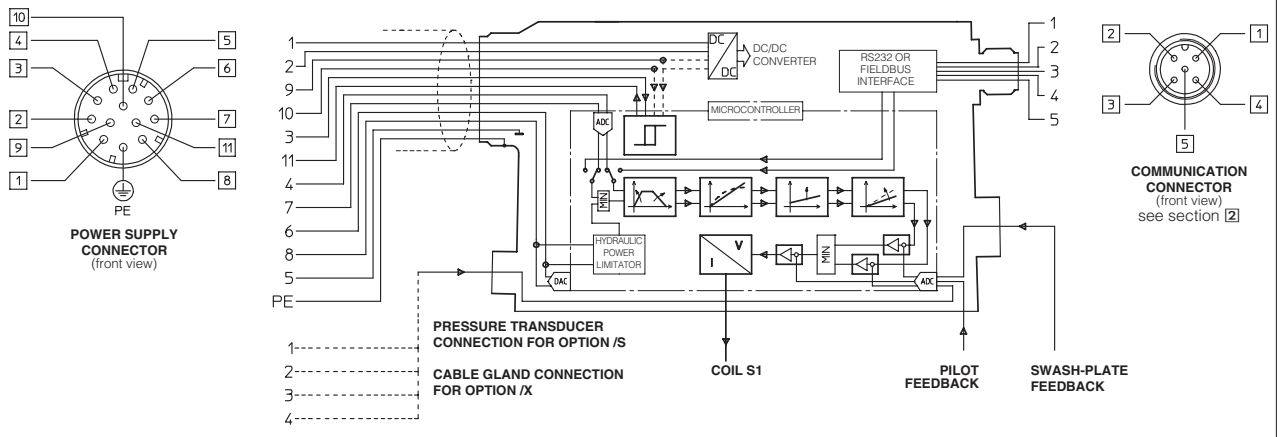
NOTE: with -BC and -BP options, the connections 5, 6, 7, 8 can be used to operate the pump with analogue signals during start-up and maintenance.

POWER SUPPLY CONNECTOR		
PIN	DESCRIPTION SIGNAL	SIGNAL
1	power supply 24 VDC	Stabilized: +24 VDC
2	power supply zero	Filtered-rectified: Vrms 21-33 (ripple max 2 Vpp)
3	Fault	Alarm = 0 VDC Correct functioning = +24 VDC
4	Signal zero	Reference 0 VDC
5	Flow input signal	0 ÷10 VDC (referred to pin 4); 4 ÷ 20 mA with option /I
6	Flow monitor	0 ÷10 VDC (referred to pin 4); 4 ÷ 20 mA with option /I
7	Pressure input signal	0 ÷10 VDC (referred to pin 4); 4 ÷ 20 mA with option /I
8	Pressure monitor	0 ÷10 VDC (referred to pin 4); 4 ÷ 20 mA with option /I
9	Power limitation enable	Power limitation enabling input normal working 24 VDC
10	Pressure feedback + VDC	0 ÷10 VDC 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)

COMMUNICATION CONNECTOR				
Communication option	PIN number - Signal description	–PS (Serial) Male connector	–BC (CANopen) Male connector	–BP (PROFIBUS DP) Female connector (reverse key)
	1	NC Not connected	CAN_SHLD Shield	+5V Termination voltage
	2	NC Not connected	NC Not connected	LINE -A Bus line (high signal)
	3	RS_GND Signal zero data line	CAN_GND Signal zero data line	DGND Signal zero data line / termination voltage
	4	RS_RX valves receiving data line	CAN_H Bus line (high signal)	LINE-B Bus line (low signal)
	5	RS_TX valves transmitting data line	CAN_L Bus line (low signal)	SHIELD Shield

(1) for options /S, see section 3

3 ELECTRONIC AND WIRING BLOCK DIAGRAM FOR -PES/S



POWER SUPPLY CONNECTOR (OPTION /S) for /PS execution			POWER SUPPLY CONNECTOR (OPTION /S) for /BC and /BP executions		
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	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I	4	Flow input signal	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I
5	Signal zero	Reference 0 VDC	5	Signal zero	Reference 0 VDC
6	Flow monitor	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I	6	Flow monitor	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I
7	Pressure input signal	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I	7	Pressure input signal	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I
8	Pressure monitor	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I	8	Pressure monitor	0 ÷10 VDC(referred to pin 5); 4 ÷ 20 mA with option /I
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÷20 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÷20 mA feedback signal from the remote pressure transducer, instead of the standard 0÷10 V.

4.3 Option /S

with -PS executions

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.

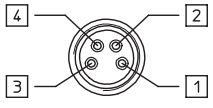
PID SET SELECTION				
PIN	**SET 1**	**SET 2**	**SET 3**	**SET 4**
9	0	0	24 VDC	24 VDC
10	0	24 VDC	24 VDC	0

with -BC and -BP executions

Option providing the same characteristics of option **/S** with -PS execution, 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.

4.4 Pressure transducer connector (only for options /S)

The pressure transducer and the 4 pin connectror 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**	**options /CS** (Ri = 316 Ω)	**CONNECTOR** (front view)
1	Pression - 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)	

4.5 Option /I (current reference signal)

The valve electronics is provided for 4÷20 mA current reference signals and monitor signals, instead of the standard 0÷10 V.

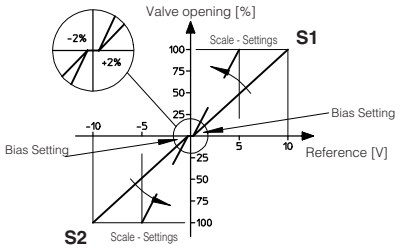
5 MAIN CHARACTERISTICS OF DIGITAL INTEGRAL ELECTRONIC DRIVERS

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	Imax= 3.3 A square wave PWM type		
Analog input signal impedance	Voltage signal Ri > 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	**Serial interface (option -PS)**	**CANopen 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	Personal Computer	PC or master CANopen device	PC or master PROFIBUS DP device

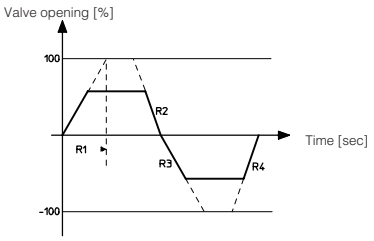
Note: A minimum time of 300 to 500 ms have be considered between the driver energizing with the 24 VDC power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

6 SOFTWARE SETTINGS

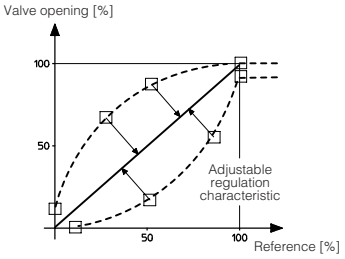
SCALE AND BIAS



UP AND DOWN RAMPS



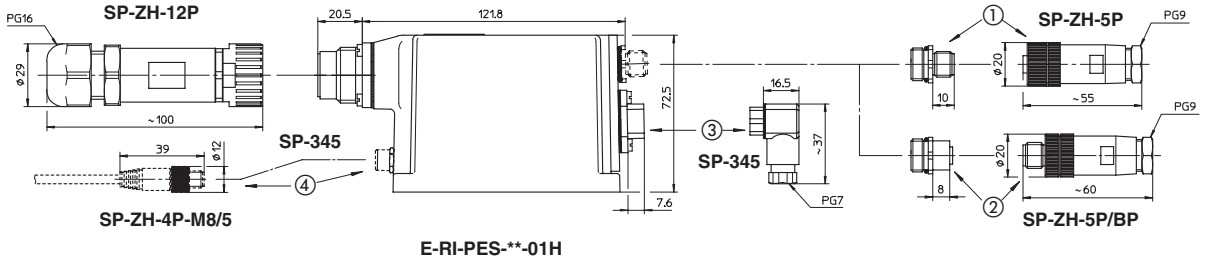
LINEARIZATION



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]

12 PIN CONNECTOR



E-RI-PES--01H**

① For communication interface -PS or -BC
② For communication interface -BP
③ Swash plate transducer connector
④ Pressure transducer connection: connector type M8 for option **/S** (connector moulded on cable 5 mt lenght)
cable gland connection for option **/X**

8 PROGRAMMING DEVICES

The driver configuration and parameters can be easily set with the Atos E-SW programming software.
The programming software is available in three different versions according to the driver's communication interfacing:
E-SW-PS/S (Serial), **E-SW-BC/S** (CANopen) and **E-SW-BP/S** (PROFIBUS DP).
A proper connection is required between the PC and the electronic driver communication port (-PS, -BC or -BP).
For a more detailed decription of software interface, PC requirements and adapter/cable/terminator characteristics please refer to technical table **G500**.

Programming software, must be ordered separately :

E-SW-* (mandatory - first supply) = Dvd including E-SW-* software installer, operator manuals, registration form for Atos digitals service
E-SW-*-N (optional - next supplies) = as above but not including the registration form for Atos digitals service

USB Adapters, Cables and Terminators, can be ordered separately

E-A-PS-USB/DB9 and **E-C-PS-DB9/M12** = USB adapter and cable for -PS drivers
E-A-PS-USB/DB9 adapter is required only if a RS232 serial port is not available on the PC

E-A-BC-USB/DB9, E-C-BC-DB9/M12 and **E-TRM-BC-DB9/DB9** = USB adapter, cable and terminator for -BC drivers
E-A-BP-USB/DB9, E-C-BP-DB9/M12 and **E-TRM-BP-DB9/DB9** = USB adapter, cable and terminator for -BP drivers
E-TRM-BC-DB9/DB9 (CANopen) and E-TRM-BP-DB9/DB9 (PROFIBUS DP) fieldbus terminators are required when the adapter is directly connected to the digital driver or to one end of the fieldbus network

9 FIELDBUS FEATURES

9.1 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 the E-SW-BC Dvd - see table G500

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 user manual enclosed in the E-SW-BP Dvd).
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 the E-SW-BP Dvd - see table G500

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 mm² (signal) LiYY 3 x 1 mm² (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	Serial (-PS) or CANopen (-BC) CONNECTOR	PROFIBUS DP (-BP) CONNECTOR	PRESSURE TRANSDUCER CONNECTOR OPTIONS /S
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 mm²
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)