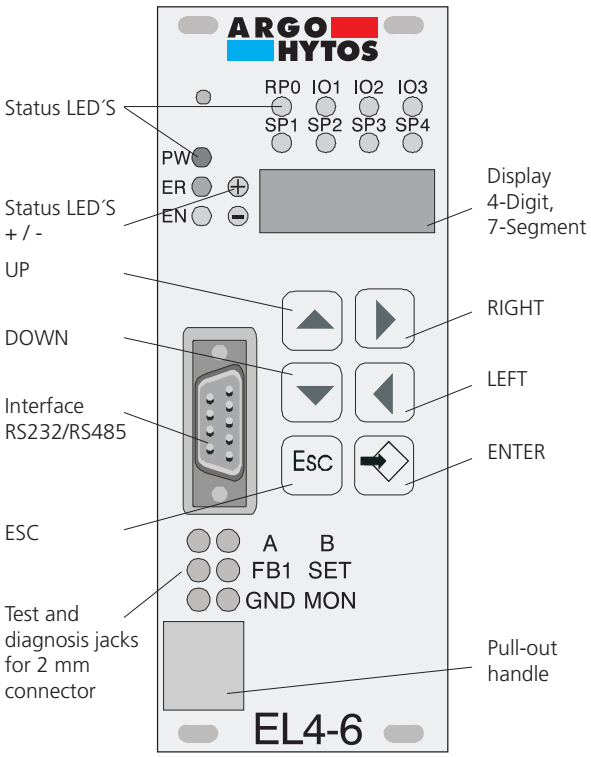
EL4

Technical Features

- Digital electronic control unit for closed- and open-loop control of single or double solenoid proportional valves with positional feedback control - Eurocard type
- The unit is suitable for control of various proportional valves as directional, flow, pressure and servo valves and regulates feed back from various process values
- The unit controls the position of the valve spool according to the reference input signal ensuring linear regulation with minimum hysteresis
- The unit supplies a variable current proportional to the input reference signal and independently of temperature variations or load impedence
- The PWM stage on the solenoid power supply reduces valve hysteresis thus optimising control precision
- Large, easy-to-use adjustments and readout 4-digit 7-segment LED display to indicate card functions and potentiometers to optimize control
- The unit is suitable for management of various process values as"fast-slow" work cycles, P/Q, pressure cascade controls
- Flexible and reliable system using a 16 Bit microcontroller with high power reserve
- Highly flexible settings with the help of the intergrated software. Assured safety through the use of a hardware watch-dog and reset module
- Error resistant unit - signals do not degrade because they are transmitted or stored with integrated error-correcting algorithms if corruption does occur
- Variable settings for various solenoid systems and sensor signals providing a high degree of flexibility
- Easy software update by use of a Flash-EPROM. Adaptations and extensions can be made without change to EPROM (download from PC via RS232)

Functional Description

Display and Keypad



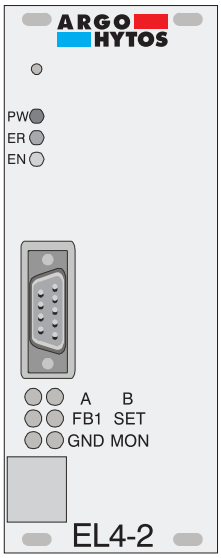
The EL4 card is multifunctional electronic control unit in Eurocard format for open and closed loop control of single or double solenoid proportional valves typically with positional feedback control. The unit controls the position of the valve spool according to the reference input signal ensuring linear regulation with minimum hysteresis. The front panel is fitted with LEDs to indicate the card functions and selectros for parametrization together with 2 mm jacks for test and diagnostics.
The EL4 card option is designed to accommodate up to 2 process signals.

Functional use of the interface allows to change parameters "on-the-fly" without interference or interrupting the controller.
The unit provides means for system performance analysis through display parameters selection with the PC or the monitoring program. Direct access to the amplifier with the use of external system controllers (e.g. programmable logic controllers /PLC) is possible.
The EL4 card enables access to different amplifiers from a PC or a controller by addressing them (using option RS485) and sending data from amplifier to amplifier (copy parameter settings)

Element	Function
Status LED´s	display of status and signals at the digital inputs and outputs
Status LED´s + / -	display of set point direction through polarity signs for parameters and measured values
Display	4-digit display of parameters and measured values
Buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER	all operating, programming and saving may be performed with the buttons UP, DOWN, LEFT, RIGHT, ESC and ENTER
Serial interface	RS232/RS485 (optional), trough which programming and accessing parameters via PC or communications to machine, or from amplifier to amplifier
Measuring and test jacks	direct measurement of set point, actual value, solenoid currents and internal values via the monitor output. Use 2 mm sockets (S1.06, FB1, A, B, d1.01 ... d2.13)

Technical Data

Without display



With display

Main paremeters	
Operating voltage	UB = 24 VDC (12 VDC on request)
Upper limit value	UB(t) max. = 30 V
Lower limit value	UB(t) min. = 18 V
Residual ripple	< 10%
Current consumption I (A) Solenoid systems selection	I max. = 3.15 A 0.8 / 1.1 / 1.3 / 1.6 / 2.4 / 2.7 / 3.5 (other versions on request)
Input power	50 W
Maximum output current (fast fuse)	3.15 A
Reference signal	± 10 V, max. load 10 mA
Control voltage for external recallable set point Residual ripple	24 V ± 10% ≤ 10% current input ≤ 20 mA each
Ambient temperature	0 ... 50 °C (32 ... 122 °F)
Storage temperature	-20 ... 60 °C (-4 ... 140 °F)
Plug connection	DIN 41 612, 48 pol. form F gold plated
EMC	
Protection	Burst on wires as per EN 61000-4-4 HF-Field as per EN 61000-4-3 ESD as per EN 61000-4-2
Emissions	Emissions depending on power as per EN 50011 Radiated emissions as per EN 55011
Dimensions	
Front panel PCB	50.5 x 128.4 mm (1.99 x 5.06 in) 10 TE / 3 HE 100 x 160 mm (3.94 x 6.30 in)
Input signals	
Analog set values	1 input, differential 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 ... ± 10 V 1 input, single ended 14 Bit resolution, 0 or 4 ... 20 mA (R = 250 Ω)
Analog feedback (sensor input)	1 input, 14 Bit resolution, 0 ... ± 12 V, 0 ... 20 mA / 4 ... 20 mA Offset: 3 ... 10 V, Gain: ca. 0 ...14 (R = 100 Ω) 1 input, 14 Bit resolution, 0 ... ± 10 V
Digital inputs	8 inputs, voltage level 0 V / 24 V, 10 mA (Set point 1 ... 4, ENABLE, RAMP, SIGN +, SIGN -)
Output signals	
Solenoid current (with over-energization and quick de-energization)	2 output stages for up to 3.5 A
Analog output (for controlling of subsequent electronic)	1 output, 12 Bit resolution, 0 ... ± 10 V
Monitor output (for monitoring of internal values)	1 output, 12 Bit resolution, 0 ... ± 10 V
Digital outputs (Error, Comparator)	2 outputs, voltage level 0 V / 24 V, 10 mA
Test jacks	Solenoid current, sensor 1, set value, Monitor and GND
Auxiliary voltage	± 10 V, max. load 10 mA
Optional I/O signals	3 in or outputs, output level 24 V, input level 5 V or 24 V
	(5 V level for incremental sensors on request)
Interface	
	RS232 or RS485 with 9-pol Sub-D connector at front panel; RS485 also at back connector available (RS485 functions in preparation)
Display and operation	
EL4-6 versions	4 digit display, 6 buttons (up, down, left, right, enter and Esc) Status-LED's: PW (Power), ER (Error), EN (Enable), SP1 ... SP4 (S1.01 ... S1.04), RP0 (Ramp = 0), IO1 ... IO3"
EL4-2 versions	Status-LED's: PW (Power), ER (Error), EN (Enable)
Frequencies and cycle times	
PWM Frequency	18 kHz
Cycle times	Current controller ca. 0.22 ms, inner closed loop controller ca. 0.22 ms (for valve feedback), external closed loop controller ca. 0.44 ms (twice inner loop)
Accessories	**Ordering Number**
Connecting cable to PC and EL4 - 5 m (196.9 in)	23144800
CD - ROM with software and manual (English, German version), connecting cable 5 m (196.9 in)	23144600

Ordering Code

EL4 - □ - □ - □

Digital Control Electronics, External, Eurocard Format

Model

Without display	**2**
With display	**6**

Operation mode

Control: 1 valve with 2 solenoids, open loop, without feed back	**01**
Control: 2 valves with 1 solenoid each, open loop, without feed back	**02**
Regulation (valve): 1 valve with 2 solenoids, closed loop, with valve spool position feed back	**03**
Regulation (process): 1 valve with 2 solenoids, closed loop with 1 process value feed back	**04**
Reserve mode (not used)	**05**
Dual regulation: 1 valve with 2 solenoids, closed loop with valve spool position feed back and 1 process value feed back	**06**

Solenoid size at the proportional valve

04	Size C19
06	Size C22
10	Size C31

Operation mode

07	Dual regulation: 2 independent valves with 1 solenoid each, closed loop with valve spool position feed back at one valve
08	Dual regulation: 2 independent valves with 1 solenoid each, closed loop with valve spool position feed back at each valve
09	Reserve mode (not used)
10	Regulation (process only, without valve): control of other electronic unit (e.g.amplifier) and regulation of 1 process value
11	Regulation (process only, without valve): control of other electronic unit (e.g.amplifier) and regulation of 2 process values

Hardware - Block Diagram

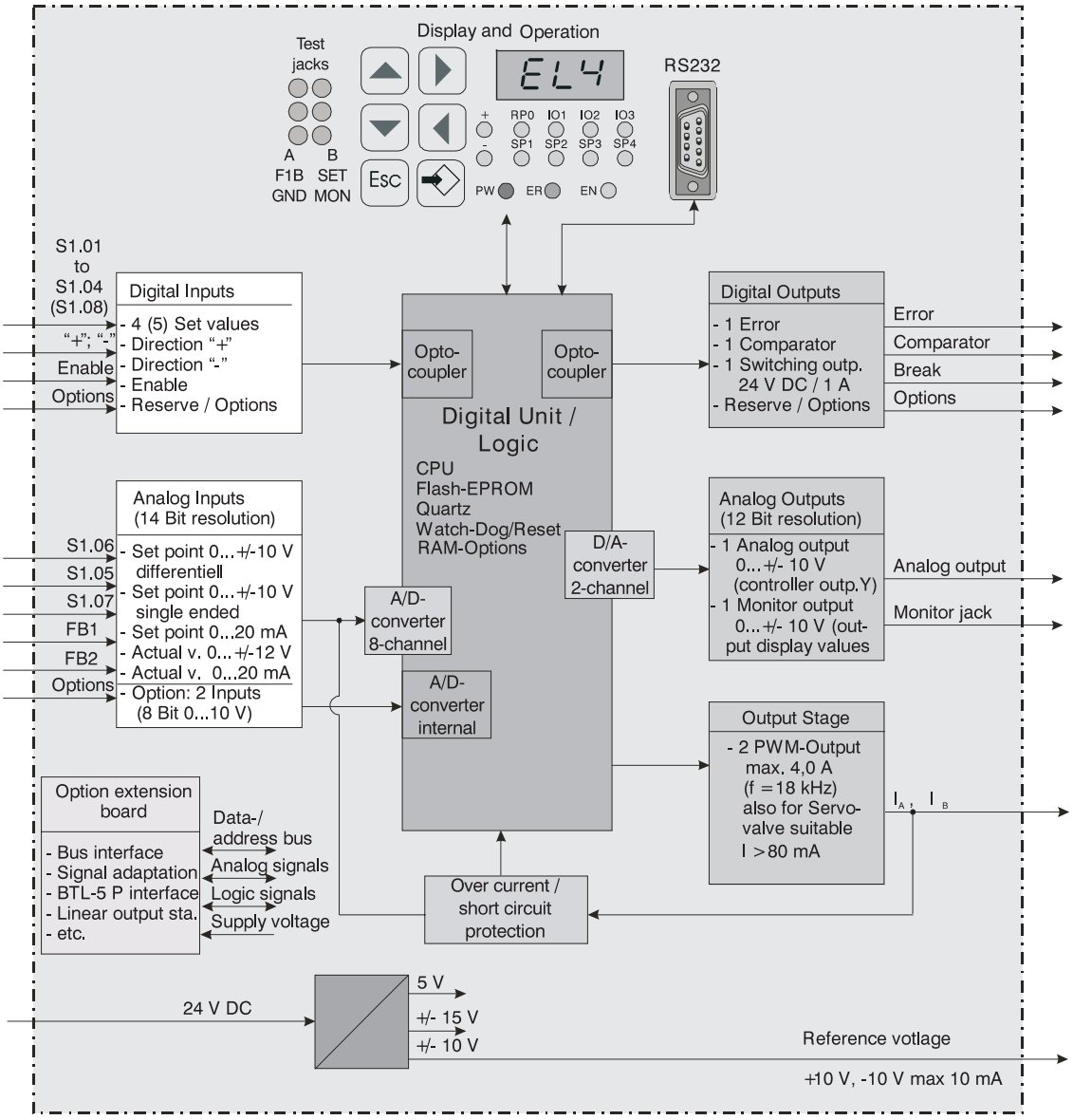
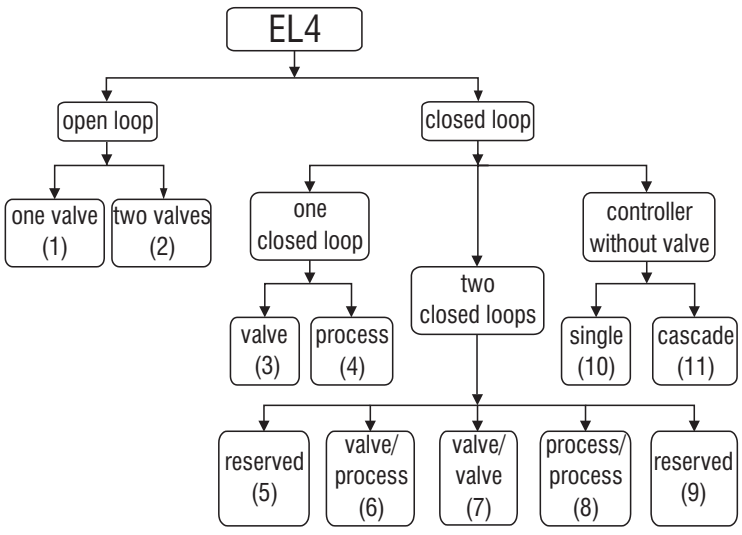


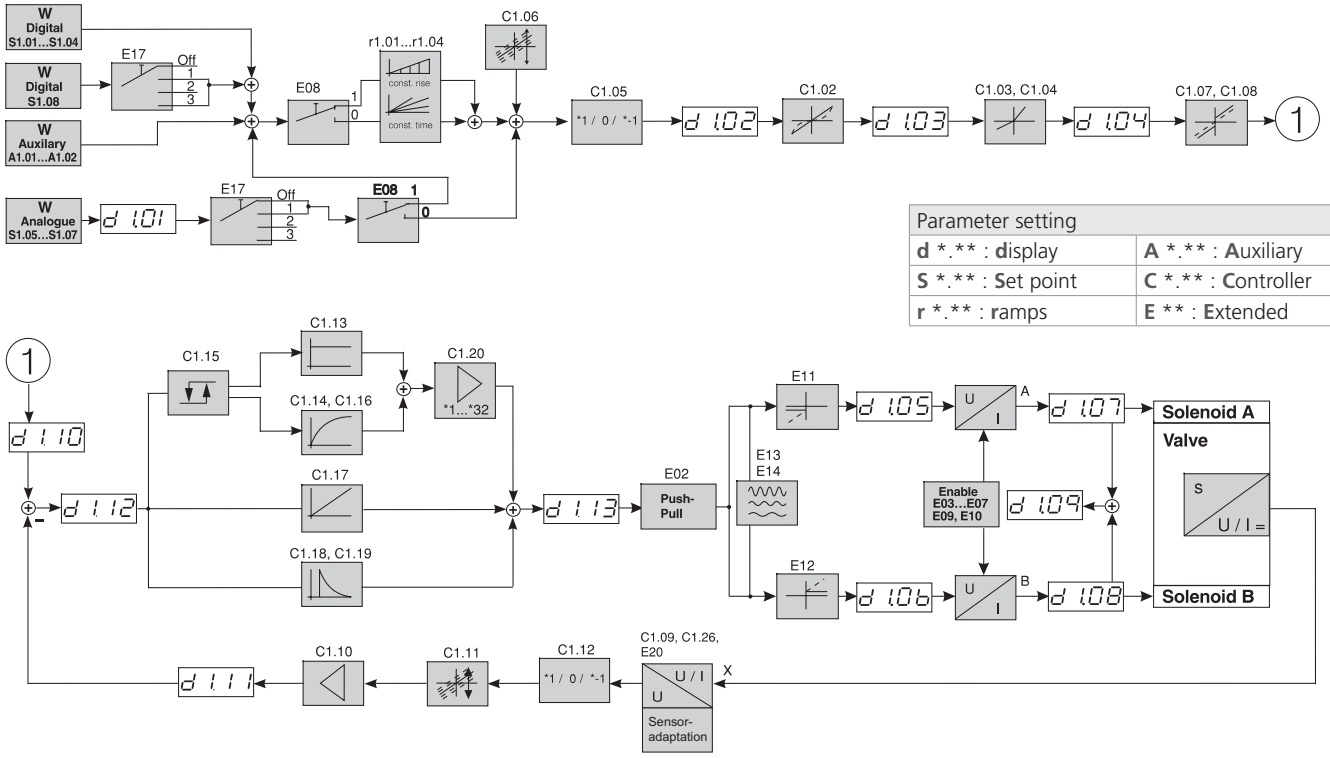
Diagram of Operation Modes

Operation modes

01 Control: 1 valve with 2 solenoids, open loop, without feed back
02 Control: 2 valves with 1 solenoid each, open loop, without feed back
03 Regulation (valve): 1 valve with 2 solenoids, closed loop, with valve spool position feed back
04 Regulation (process): 1 valve with 2 solenoids, closed loop with 1 process value feed back
05 Reserve mode (not used)
06 Dual regulation: 1 valve with 2 solenoids, closed loop with valve spool position feed back and 1 process value feed back
07 Dual regulation: 2 independent valves with 1 solenoid each, closed loop with valve spool position feed back at one valve
08 Dual regulation: 2 independent valves with 1 solenoid each, closed loop with valve spool position feed back at each valve
09 Reserve mode (not used)
10 Regulation (process only, without valve): Control of other electronic unit (e.g.amplifier) and regulation of 1 process value
11 Regulation (process only, without valve): Control of other electronic unit (e.g.amplifier) and regulation of 2 process values

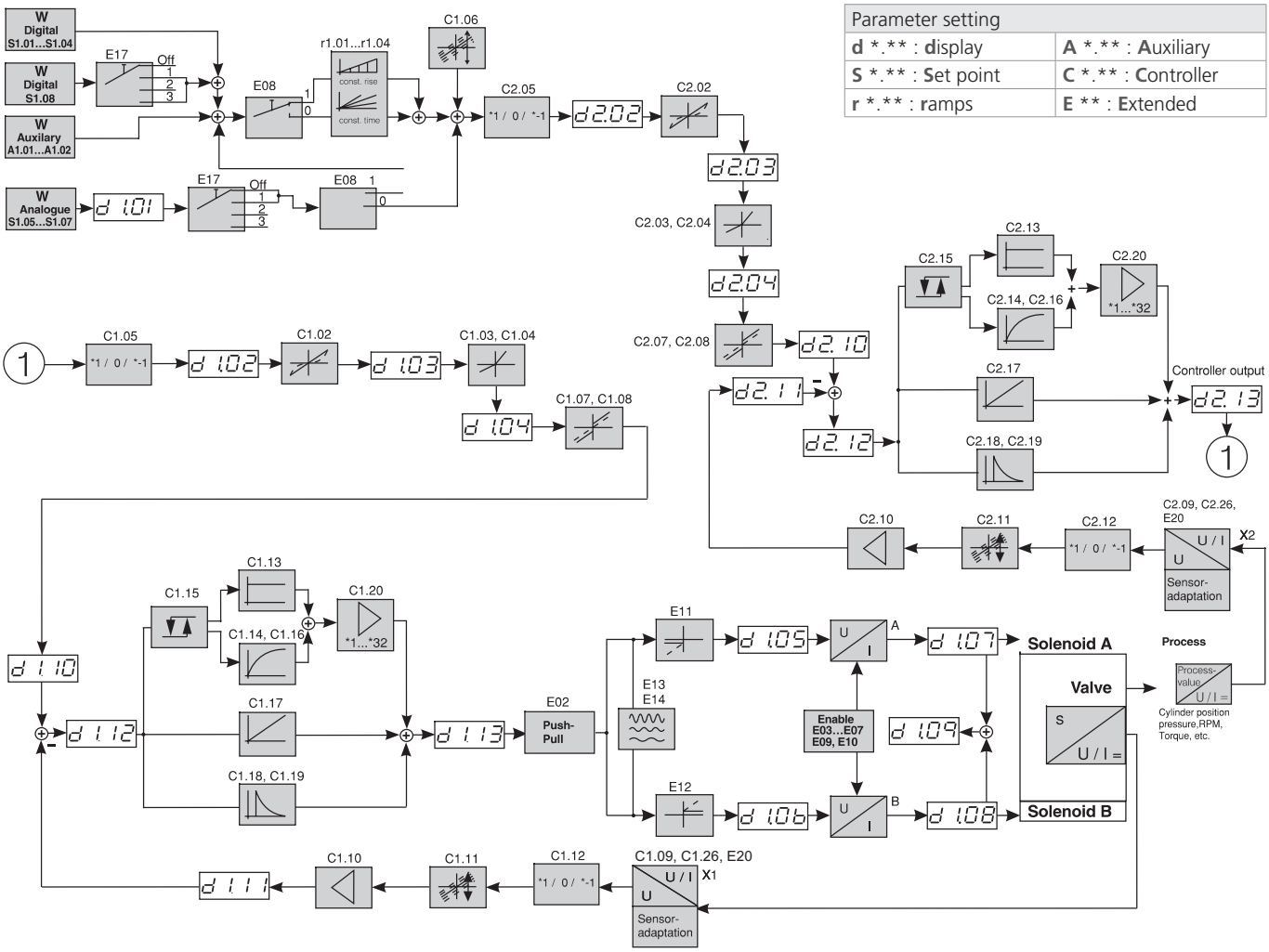


Mode 03 Regulation (valve):
1 valve with 2 solenoids, closed loop, with valve spool position feed back



Parameter setting	
d *.** : **d**isplay	**A** *.** : **A**uxiliary
S *.** : **S**et point	**C** *.** : **C**ontroller
r *.** : **r**amps	**E** ** : **E**xtended

Mode 06 Dual Regulation:
1 valve with 2 solenoids, closed loop, with valve spool position feed back and 1 process value feed back



Parameter setting	
d *.** : **d**isplay	**A** *.** : **A**uxiliary
S *.** : **S**et point	**C** *.** : **C**ontroller
r *.** : **r**amps	**E** ** : **E**xtended