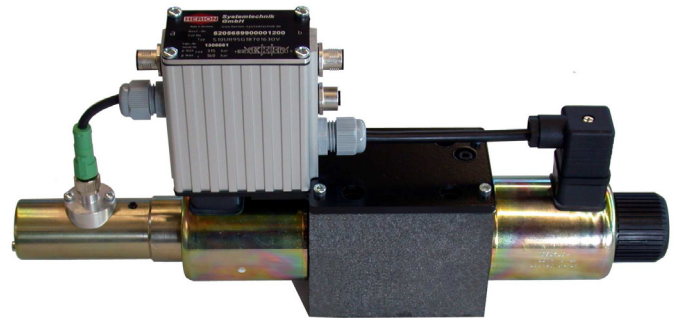


**Proportional directional control valves nominal size 10
directly controlled with integrated digital electronics
Interface to DIN 24 340 and ISO 4401 (CETOP03)
PPN [p_{max.}] = 315 bar**

- Speed and direction control according to setpoint input**
- Position-controlled piston**
- Program control, remote control**
- Spring-centred, robust design**
- Low-cost system solution**
- Analogue interface for setpoint and actual value**
- High repeat accuracy and small hysteresis through piston position-control**
- Process control (cascaded controller) possible through external actual value input**
- Quick and easy parametrization via PC with operating software (USB adaption)**



Parameters

General parameters

Designation:
Direct-controlled proportional directional control valve nominal size 10 with integrated digital electronics

Symbol:
see device set-up or type key

Design:
Spool valve

Mounting method:
Flange mounting

Cable connection:
Subplate

Installation position:
preferably horizontal

Mass of directional valve:
[kg]: 7.5

Mass of the associated subplate:
G 1/2 [kg]: 0.7
G 3/4 [kg]: 1

Mass of the associated pressure balance 6015530:
[kg]: 3.3

Ambient temperature range ϑ_u [°C]:
0 to +50

Nominal size:
10

Hydraulic parameters

Operating pressure range
 $p_{e,max}$ [bar]
for connection P, A, B:
up to 315
for connection T:
up to 160

Pressurising fluid temperature
 ϑ_u max. [°C]:
+70

Viscosity: ν [mm²/s]:
12 to 500

Flow rate Q_{max} [l/min]:
See characteristic curves

Hysteresis [%]:
< 0.5%

Responsiveness [%]:
< 0.1%

Reversal error [%]:
< 0.1%

Oil cleanliness class according to ISO 4406: 20/18/15

Zero flow for Δp 100 bar (without pressure balance)
[cm³/min]:
< 100

Additional parameters

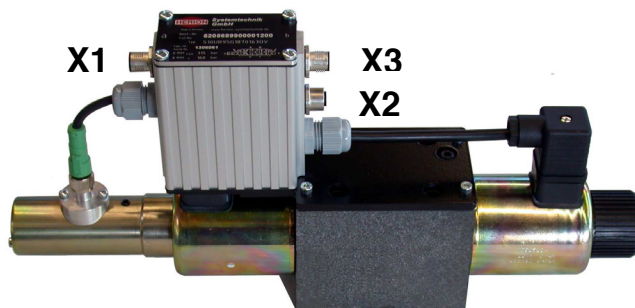
Regulating times approx. [ms]:
0%..80%: 45
80%..0%: 60

On-time ED_{ret} [%]:
100

Protection class for solenoid and electrical connection according to DIN 40050:
IP 65 (with mounted plug)

Proportional directional control valves nominal size 10

Connection assignment



X1 (energy supply, setpoint)

8-pin			
	Supply voltage	1	+24 VDC (18 V to 30 V power) *
	Supply voltage	2	+24 VDC (18 V to 30 V power) *
	Supply voltage	3	0 V (Power) *
	Supply voltage	4	0 V (Power) *
	Reference output	5	Reference output +10.0 V
	Setpoint input	6	Analogue GND
		7**	0 ... ±10 V
	Protective earth	8	PE

* For current load > 2 A, all connections 1 – 4 must be used

** Factory-provided in the parameterization for 0 ... ±10 V set

X2 (external actual value, 24 V output)

5-pin			
		1	+24 V DC output
	External actual value	2	0 ... 20 mA
	External actual value	2	4 ... 20 mA
	External actual value	2	12 mA ± 8 mA
	External actual value	2	0 ... 10 V
	External actual value	2	0 ... ±10 V
	External actual value	2	6.0 V ±2.5 V
	External actual value	2	7.5 V ±2.5 V
	External actual value	2	6.0 V ±4.0 V
	External actual value	2	7.5 V ±3.9 V
		3	GND
		4	n.c.
		5	n.c.

X3 (RS232 interface)

5-pin			
		1	n.c.
		2	n.c.
		3	GND
	RS232 Interface	4	TxD
	RS232 Interface	5	RxD

Digital electronics / drive card

Supply voltage [V DC]: 24 (18 ... 30) Ripple < 10%	Emitted interference: EN 61000-6-3:2007 + A1:2011 and EN 61000-6-4: 2007 + A1: 2011	Setpoint input signals: Signal	Wire break Monitoring	Analogue actual values: 1 x sensor input for process control (mode 6) 12-bit resolution
Max. power consumption [VA]: 50	Ambient temperature range θ_u [°C]: 0 to +50	0 ... ±10 V 0 mA ... 20 mA 10 mA ... ±10 mA 4 mA ... 20 mA 4 mA ... 20 mA 12 mA ... ±8 mA 12 mA ... ±8 mA 5 V ±5 V	*1 --- without with without with without with ---	4 ... 20 mA 12 mA ± 8 mA 0 ... 10 V 0 ... ±10 V 6.0 V ±2.5 V 7.5 V ±2.5 V 6.0 V ±4.0 V 7.5 V ±3.9 V
EMC guidelines for fault-free operation: EN 61000-6-2:2005 and EN 61000-4-2	Storage temperature [°C]: -20 to +60	*1 if activated		Interface RS232 via 5-pin M12x1 plug on the aluminium casing X3 (adapter cable to USB, see accessories)

Construction

The proportional directional control valves nominal size 10 are built according to the 5-chamber system and are designed as spool valves. The valve is proportionally solenoid-operated and is controlled directly. The solenoids are controlled via digital control electronics. The valve setting / piston position will be recorded by a position measuring system and supplied as an actual value of the closed loop control. Disturbances will be compensated. The selected setpoint is thus constantly achieved exactly. The actual position value will be detected by an inductive differential transformer with integrated electronics. A process control is possible through an additional, external analogue actual value input.

Application

The proportional directional control valve can be used for the directional and speed control of hydraulic cylinders and hydraulic engines and is used where an expensive servo-valve is too costly and a normal directional valve does not suffice in terms of function. Due to the steadily controllable signal, the various movements can be easily and very precisely moved via the electric remote control.

Mounting

The devices are attached to the subplates with screws and sealed with O-rings.

Hydraulic cable connection

Subplate, interface to DIN 24 340-A 10 and ISO 4401-AC-05-4-A.

Integrated electronics

The inserted digital amplifier card is characterised by the latest technology. The circuit board meets all applicable standards for the EMC. This ensures a high interference resistance and low interference emissions. The system properties are essentially determined by the software and include sufficient power reserves to also take future developments and care measures into account.

Completely digitalised amplifier and controller with the advantages:

- No potentiometer on the card
- No setting of jumpers required
- All necessary settings/parametrizations via RS232 interface
- Safety for the user when setting
- Use of a modern 16 bit μ C

- Flash EPROM for easy software update for adaptations and extensions without replacing the EPROM (download from PC via RS232)
- Using a watchdog and reset module results in a high level of reliability and safety

Functionality when using the RS232 interface:

- Changing individual parameters "on the fly" without controller interruption or interferences

Proportional directional control valves nominal size 10

Device set-up (standard versions)

S10UR (proportional directional control valve nominal size 6, controlled)

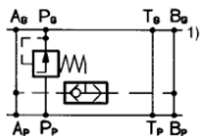
Symbol	Symbol no.	Q _{Nom.} at Δp 10 bar	Code	Type	Order number
	187	60 l/min	025	S10UR95G187 025 30V	5205717.9000.012.00
	212	60 l/min	025	S10UR95G212 025 30V	5205719.9000.012.00
	233	60 l/min	025	S10UR95G233 025 30V	5205721.9000.012.00

Other designs available on request

Subplate

Designation	Comment	Type	Order number
G1/2	Dimensional drawing, see page 9	P S 10 G 4 001 2 0 0	1065184
G3/4	Dimensional drawing, see page 9	P S 10 G 5 001 1 0 0	2840036

Pressure balance

Symbol	Comment	Order number
	The combination of a proportional directional control valve and pressure balance results in a proportional current regulation valve. This means: When using a pressure maintenance valve, the set volume flow remains nearly constant, even with varying pressure (see volume flow consistency characteristic curve). Dimensional drawing, see page 8	6015530

Fastening screws

Designation	Comment	Order number
Cylinder head screws (M6x60) DIN 912-10.9	Without pressure balance	0700411
Cylinder head screws (M6x110) DIN 912-10.9	In conjunction with pressure balance 6015530	0659221

Order

The devices are characterised by the type. The ordering code indicates the composition of the type designation. Standard versions are included in the device line-up. It is advantageous to indicate the order number in addition to the type designation for these standard versions. Other device versions can be compiled by means of type combinations. When ordering from the factory, these devices then receive an order number that is evident from the order confirmation.

O-rings are included in the scope of delivery for flange mounting devices.

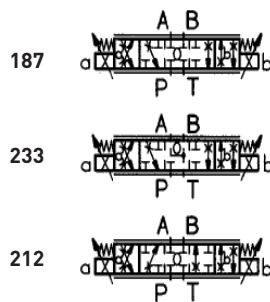
The connection plate, pressure balance, mounting screw, cable plug must be ordered separately (see accessories).

Ordering code

Proportional valve

S	10	UR	95	G	3	0	V
					1	2	3		4

1 Symbol:



(other symbols by request)

- 2 Code: **025** (see characteristic curves)
 3 Design status: **3**
 4 Sealing material: **V** – FKM (e.g. Viton)

Subplate

P	S	10	G	...	001	...	0	0
					1		2	

- 1 Pipe: **4** – G 1/2 (internal thread according to
5 – G 3/4 DIN ISO 228/1)
 2 Design status: **2**

Ordering example

4/3-directional valve nominal size 10,
 Symbol 187, code 025
 and associated subplate G1/2
 and pressure balance 6015530

Directional valve:

Type designation:
 S10 UR 95 G 187 025 3 0 V
 Order no.:
5205717.9000.012.00

Connection plate:

Type designation:
 P S 10 G 4 001 2 0 0
 Order no.:
1065184

Pressure balance:

Order no.:
6015530

Fastening screws:

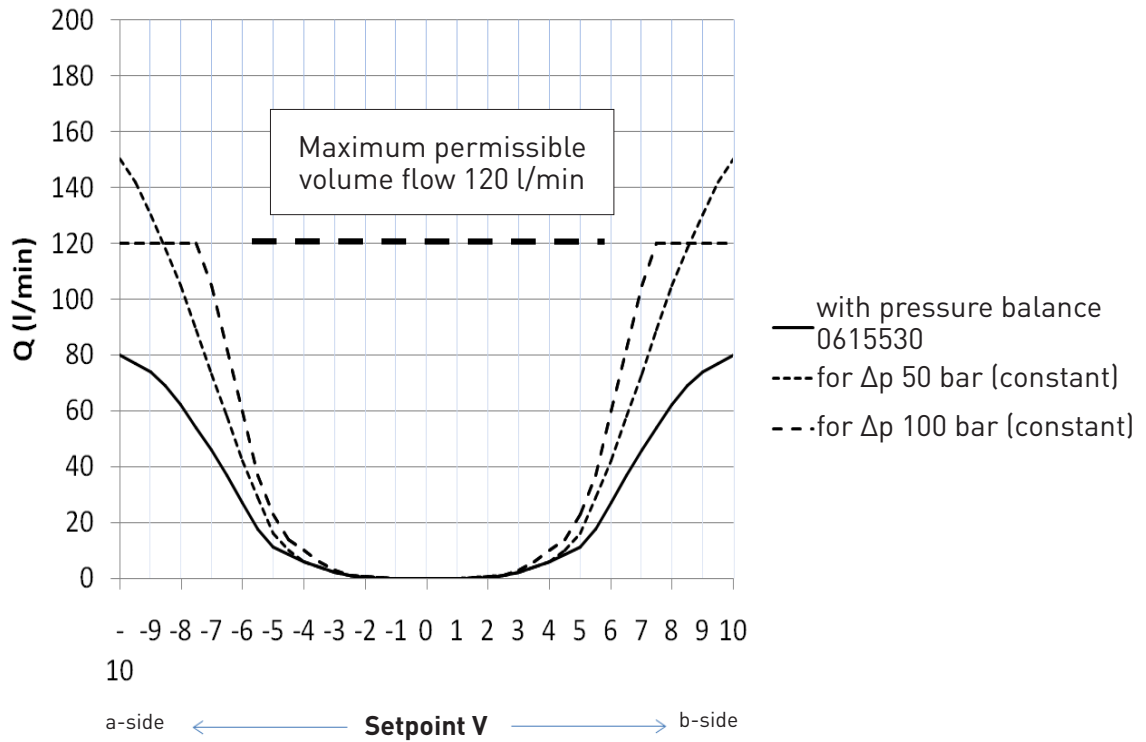
(4 pieces required)
 Cylinder head screw:
 (M 6 x 110 DIN 912-10.9)
 Order no.:
0659221

Proportional directional control valves nominal size 10

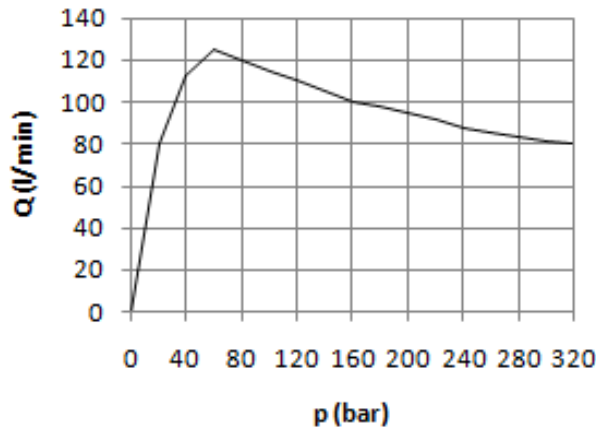
Characteristic curve S10UR without or with pressure balance 6015530

(quasi-static 0V → ±10V setpoint)

∅u: 40°C, v: 46 mm²/s



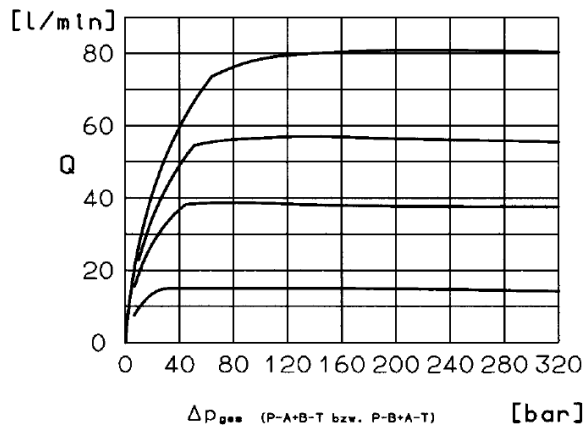
Power limit S10UR at 100% opening, without pressure balance



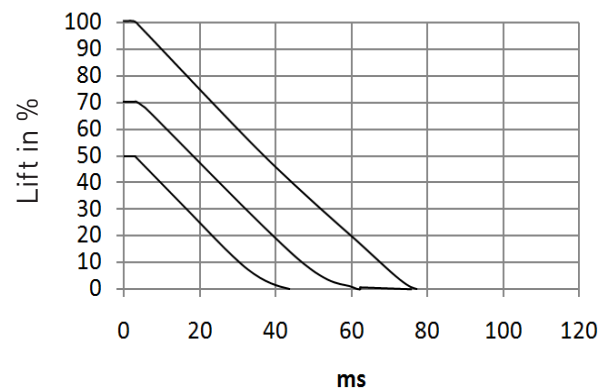
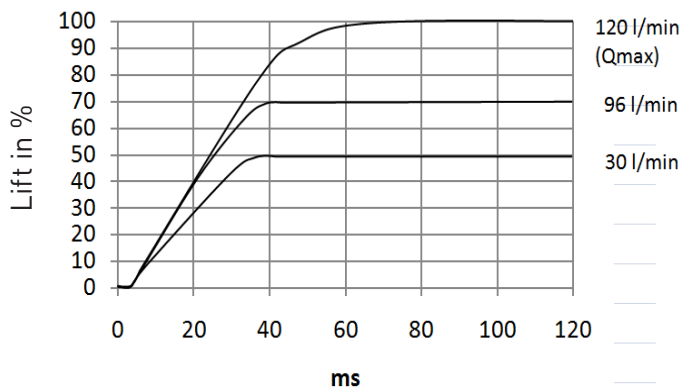
Code 25

Maximum permissible limit for volume flow 120l/min

Volume flow consistency S10UR with pressure balance 6015530



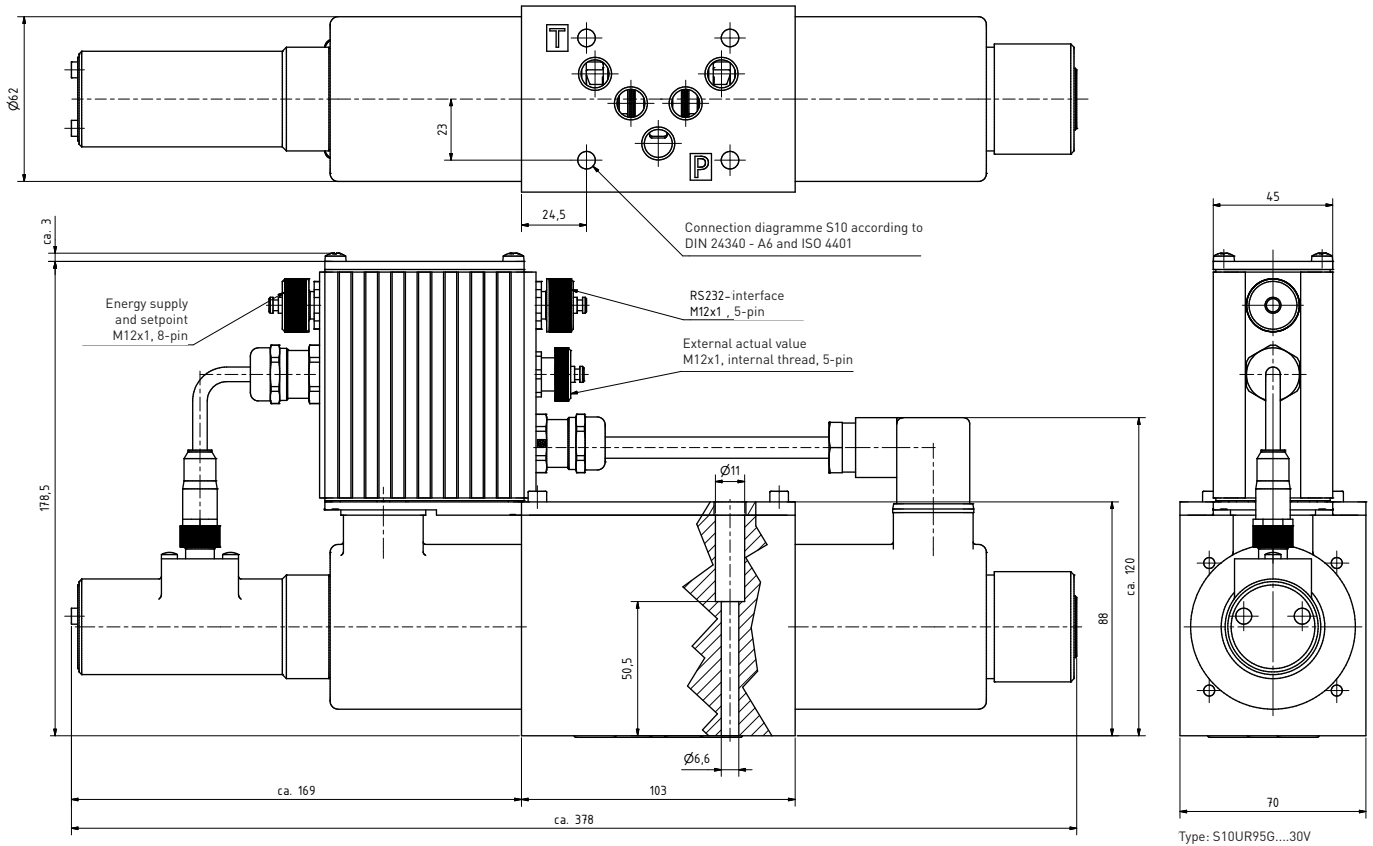
Step response S10UR without pressure balance (for Δp 100 bar)



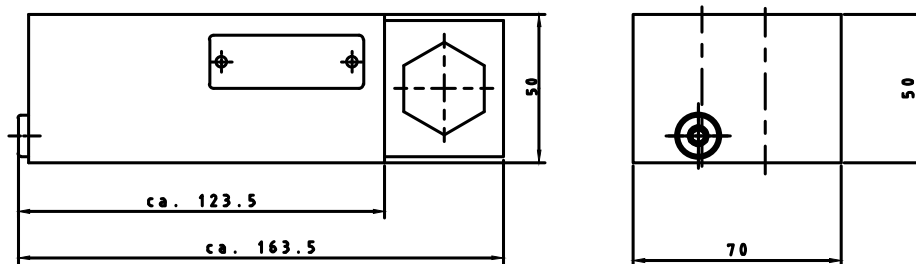
Proportional directional control valves nominal size 10

Dimensional drawings

Directional valves



Pressure balance 6015530



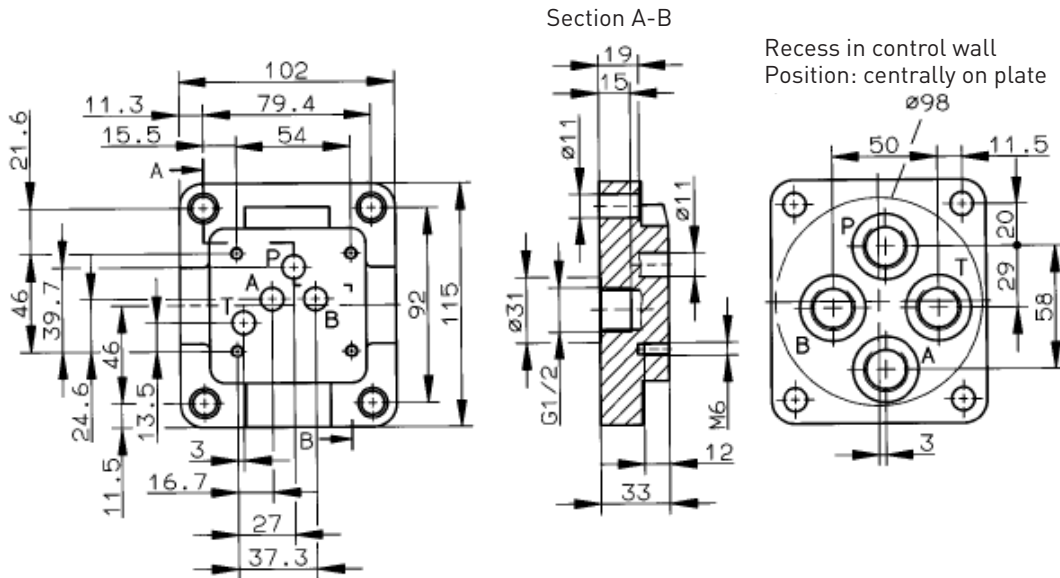
Proportional directional control valves nominal size 10

Connection plates with interface to DIN 24 340-A 10 and ISO 4401-AC-05-4-A

Connection plate 1

Order no.: 1065184

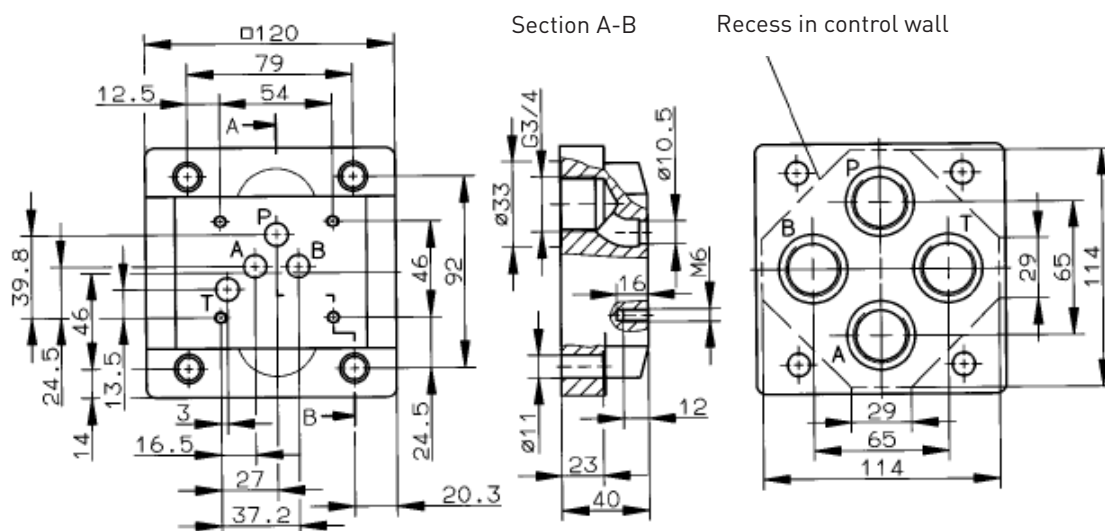
G 1/2



Connection plate 2

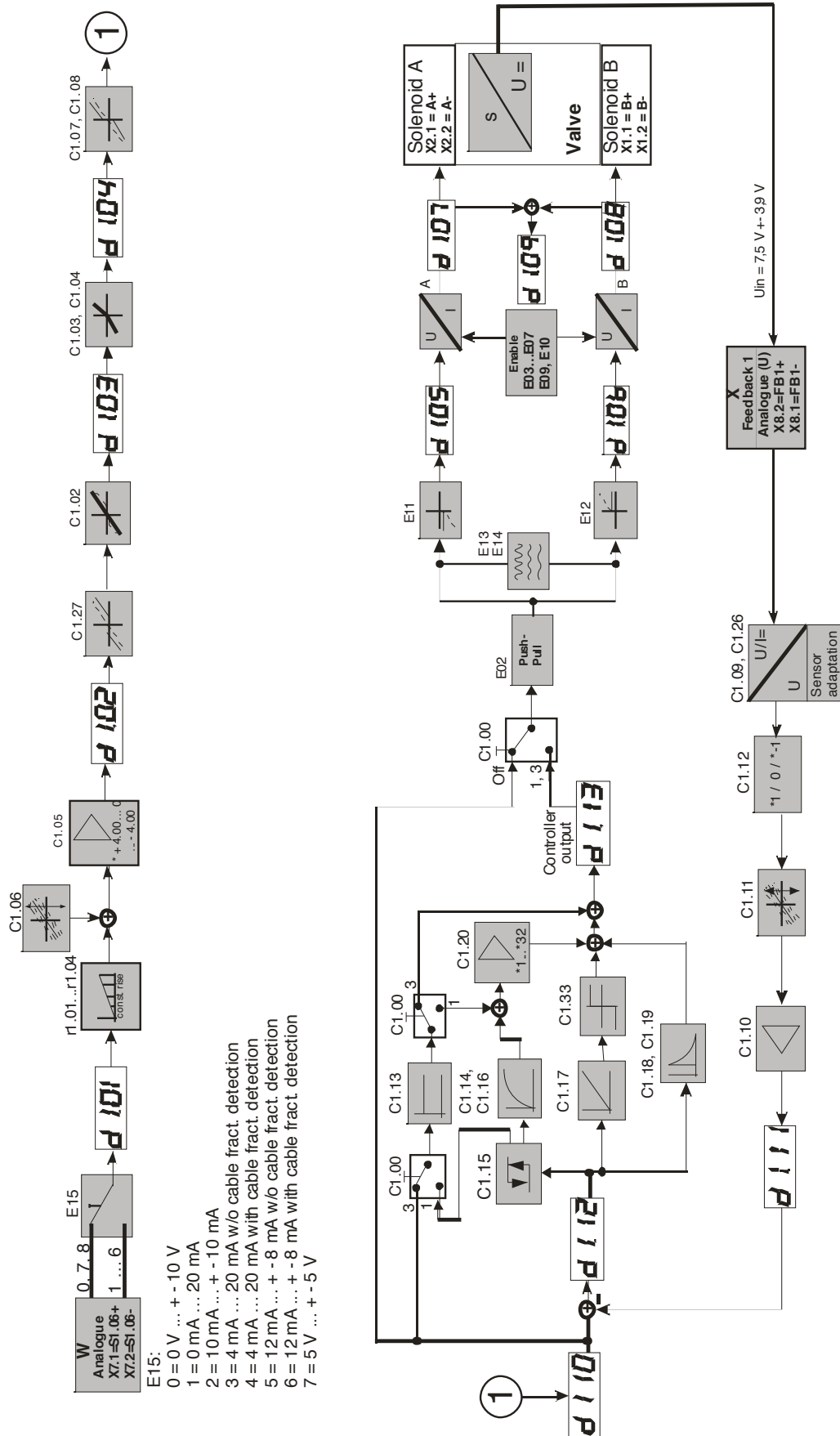
Order no.: 2840036

G 3/4



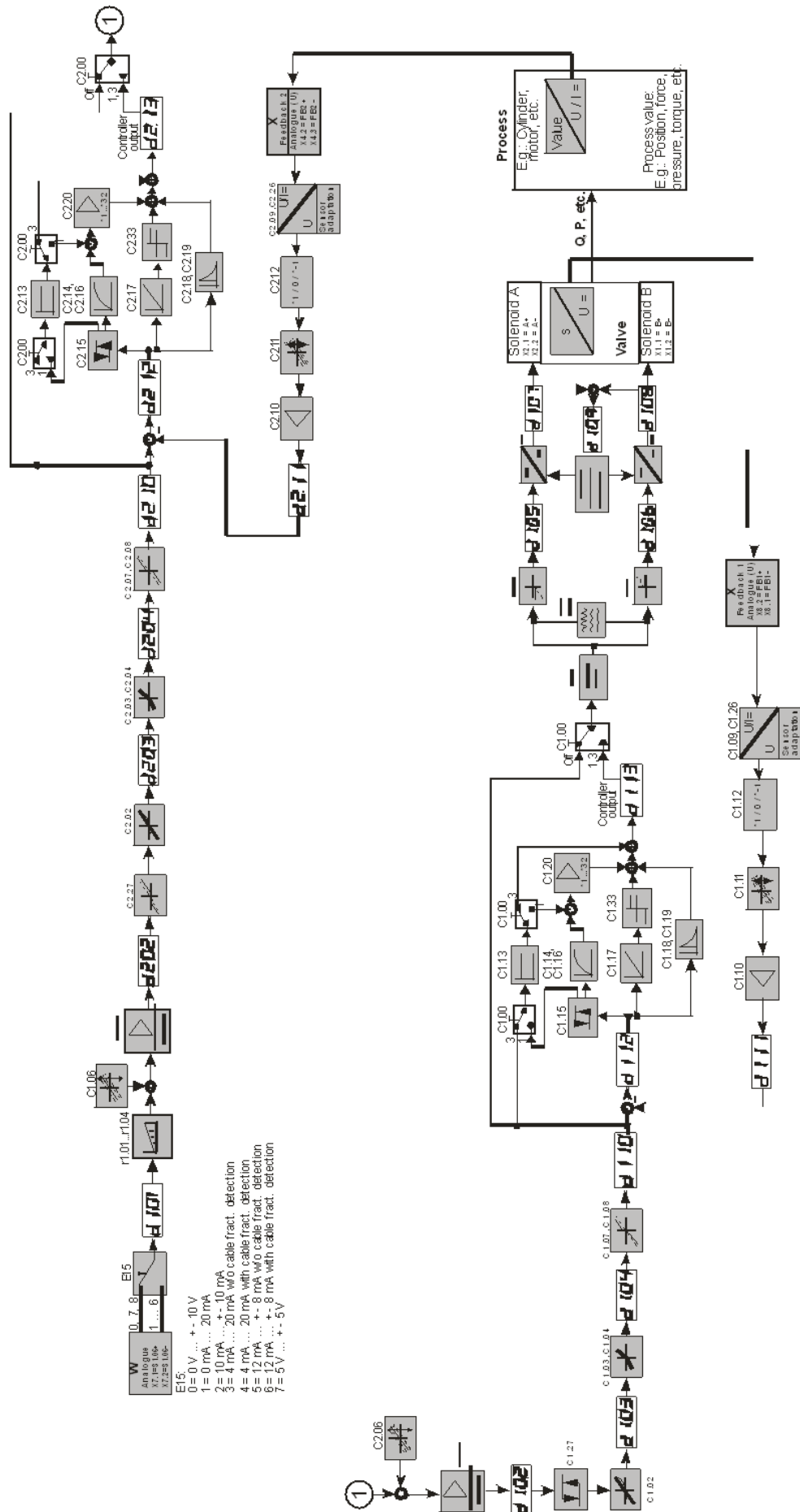
Software structure diagrams

Mode 3; regulated, one valve



Proportional directional control valves nominal size 10

Mode 6; twice regulated, a valve and process feedback



Proportional directional control valves nominal size 10

Complete parameter list

Controller Parameters Controller settings						
	Function	Unit	Step	Min	Max	Code
E00	Operating mode Set to 1 at the factory		1	1	6	3 = regulated; one valve (Return of the slide position of the valve) 6 = Double regulated; a valve (return of the slide position of the valve) and a process variable
E02	Push-Pull operation			off	1	off = off 1 = active
E03	Solenoid selection Set to 2,4 A at the factory, no changes made			0.800	2.700	1 = 0.800 = 0,8 A 2 = 1.100 = 1,1 A 3 = 1.300 = 1,3 A 4 = 1.600 = 1,6 A 5 = 2.400 = 2.4 A 6 = 2.700 = 2,7 A
E04	Excite P-component of the current controller		0001	0000	9999	
E05	Excite I-component of the current controller		0001	0000	9999	
E06	Excite P-component of the current controller		0001	0000	9999	
E07	Excite I-component of the current controller		0001	0000	9999	
E09	Time delay release	s	0.001	0.000	9.999	
E10	Solenoid current adjustment		00.01	00.50	01.10	Variable adjustment of the max. current
E11	Bias current	V	0.001	0.000	+3.000	3,000 V = 30% of the solenoid current
E12	Bias current	V	0.001	0.000	+3.000	
E13	Dither amplitude	V	0.001	0.000	+3.000	
E14	Dither frequency	Hz	0001	0001	0300	
E15	Signal definition for setpoint Set to 0 =±10 V at the factory		1	0	7	0 =±10 V 1 = 0 mA .. 20 mA (o.D) 2 = 10 mA .. ±10 mA (m.D) 3 = 4 mA .. 20 mA (o.D) 4 = 4 mA .. 20 mA (m.D) 5 = 12 mA .. ±8 mA (o.D) 6 = 12 mA .. ±8 mA (m.D) 7 = 5 V ±10 V (without wire break monitoring o.D.) (with wire break monitoring, m.D.)
E25	Enable / disable release					off = amplifier off 1 = amplifier active

Complete parameter list

Controller-Parameter controller settings for branch 1						
	Funktion	Ein- heit	Schritt	Min	Max	Code
C1.00	Regleranwahl		1	0	3	off = off 1 = P-PT1-I-DT1 3 = dff
C1.02	Characteristic curve		1	0	5	off = linear 1 ... 5 = Kurve
C1.03	Amplification A	V/V	00.01	00.00	02.00	
C1.04	Amplification B	V/V	00.01	00.00	02.00	
C1.05	Setpoint sign / amplification			-4	+4	
C1.06	Offset setpoint	V	0.001	-9.999	+9.999	
C1.07	Dead zone compensation A	V	0.001	0.000	+9.999	9.999 max. solenoid current
C1.08	Dead zone compensation B	V	0.001	0.000	+9.999	
C1.09	Sensortyp		1	1	9	7 = 7,5 V ±5,0 V
C1.10	Actual value amplification	V/V	00.01	00.00	04.00	
C1.11	Offset actual value	V	0.001	-9.999	+9.999	
C1.12	Sign actual value			-1	+1	- 1 = negative off = off 1 = positive
C1.13	P-component KP1	V/V	00.01	00.00	04.00	
C1.14	T-component for PT1 (to C1.16)	s	00.01	00.00	04.00	
C1.15	Switching threshold (C1.13/ C1.16)	V	0.001	0.000	+9.999	
C1.16	P-component KP2	V/V	00.01	00.00	04.00	
C1.17	I-component	V/s	00.01	00.00	04.00	
C1.18	D-component	Vs	00.01	00.00	04.00	
C1.19	T-component for DT1	s	00.01	00.00	04.00	
C1.20	Amplification (for C1.13 and C1.16)	V/V	2 ⁿ	1	32	Multiplier n 1, 2, 4, 8, 16, 32
C1.26	Wire break monitoring			off	1	off = off 1 = active
C1.27	Hysteresis setpoint	V	0.001	0.000	+9.999	
C1.33	Limitation of the I-controller output value for branch 1	V	0.001	0.000	+9.999	

Complete parameter list

Controller-Parameter controller settings for branch 2 (only for mode 6, process control)						
	Function	Unit	Step	Min	Max	Code
C2.00	Controller selection		1	0	3	off = off 1 = P-PT1-I-DT1 3 = dff
C2.02	Characteristic curve		1	0	5	off = linear 1 ... 5 = curve
C2.03	Amplification A	V/V	00.01	00.00	02.00	
C2.04	Amplification B	V/V	00.01	00.00	02.00	
C2.05	Setpoint sign / amplification			-4	+4	
C2.06	Offset setpoint	V	0.001	- 9.999	+9.999	
C2.07	Amplification A	V	0.001	0.000	+9.999	9.999 max. solenoid current
C2.08	Amplification B	V	0.001	0.000	+9.999	
C2.09	Offset setpoint		1	1	9	1 = 0 ... 20 mA 2 = 4 ... 20 mA 3 = 12 mA ± 8 mA 4 = 0 ... 10 V 5 = 0 ... ± 10 V 6 = 6 V ± 2,5 V 7 = 7,5 V ± 2,5 V 8 = 6 V ± 4 V 9 = 7,5 V ± 3,9V 10 = 0 ... 20 mA (no control neg. deviation) 11 = 4 ... 20 mA (no control neg. deviation) 12 = 0 ... 10 V (no control neg. deviation)
C2.10	Actual value amplification	V/V	00.01	00.00	04.00	
C2.11	Offset actual value	V	0.001	- 9.999	+9.999	
C2.12	Sign actual value			-1	+1	- 1 = negative off = off 1 = positive
C2.13	P-component KP1	V/V	00.01	00.00	04.00	
C2.14	T-component for PT1 (to C1.16)	s	00.01	00.00	04.00	
C2.15	Switching threshold (C1.13/ C1.16)	V	0.001	0.000	+9.999	
C2.16	P-component KP2	V/V	00.01	00.00	04.00	
C2.17	I-component	V/s	00.01	00.00	04.00	
C2.18	D-component	Vs	00.01	00.00	04.00	
C2.19	T-component for DT1	s	00.01	00.00	04.00	
C2.20	Amplification (for C1.13 and C1.16)	V/V	2 ⁿ	1	32	Multiplier n 1, 2, 4, 8, 16, 32
C2.26	Wire break monitoring			off	1	off = off 1 = active
C2.27	Hysteresis setpoint	V	0.001	0.000	+9.999	
C2.33	Limitation of the I-controller output value for branch 1	V	0.001	0.000	+9.999	

Complete parameter list

Ramp parameters for branch 1						Code
	Function	Unit	Step	Min	Max	
r1.01	Rampe von 0 → -	s	0.01	00.00	39.50	
r1.02	Rampe von - → 0	s	0.01	00.00	39.50	
r1.03	Rampe von 0 → +	s	0.01	00.00	39.50	
r1.04	Rampe von + → 0	s	0.01	00.00	39.50	

Display parameters for branch 1					
	Function	Unit	Step	Min	Max
d1.01	Display sum for all analogue setpoints	V	0.001	-9.999	+9.999
d1.02	Sum of all analogue setpoints after ramp	V	0.001	-9.999	+9.999
d1.03	Setpoint according to linearisation	V	0.001	-9.999	+9.999
d1.04	Setpoint according to amplification adjustment	V	0.001	-9.999	+9.999
d1.05	Control for solenoid A		0.001	-9.999	+9.999
d1.06	Control for solenoid B		0.001	-9.999	+9.999
d1.07	Solenoid current A	A	0.001	0.000	5.000
d1.08	Solenoid current B	A	0.001	0.000	5.000
d1.09	Total current for solenoid A + B	A	0.001	0.000	5.000
d1.10	Reference variable	V	0.001	-9.999	+9.999
d1.11	Actual value, control variable	V	0.001	-9.999	+9.999
d1.12	Control difference	V	0.001	-9.999	+9.999
d1.13	Controller output, manipulated variable	V	0.001	-9.999	+9.999

Display parameters for branch 2					
	Function	Unit	Step	Min	Max
d2.01	Setpoints display	V	0.001	-9.999	+9.999
d2.02	Setpoint after ramp	V	0.001	-9.999	+9.999
d2.03	Setpoint according to linearisation	V	0.001	-9.999	+9.999
d2.04	Setpoint according to amplification adjustment	V	0.001	-9.999	+9.999
d2.10	Führungsgröße	V	0.001	-9.999	+9.999
d2.11	Actual value, control variable	V	0.001	-9.999	+9.999
d2.12	Control difference	V	0.001	-9.999	+9.999
d2.13	Controller output, manipulated variable	V	0.001	-9.999	+9.999

Accessories



Designation	Description	Order number
1 HSTool	Parametrization software. Parametrization, storage and documentation of the setting. Available in German and English.	5150024
2 Cable plug for X3	USB connection cable for communication between PC and integrated electronics for interface RS232, with approx. 5 metre cable.	0618852
3 Cable plug for X1	8-pin round plug M12x1 for energy supply and setpoint	0618853
4 Cable plug for X2	5-pin round plug M12x1 for external actual value (for process control)	0618854
5 O-ring spare part kit:	Consists of 5 x O-rings	0701623

Seals available only as spare parts kit.

Repairs may only be carried out by the manufacturer or by authorised specialised personnel.

HERION Systemtechnik GmbH

Untere Talstraße 65
71263 Weil der Stadt
Tel.: +49 (0) 7033/3018-0
Fax: +49 (0) 7033/3018-10
info@herion-systemtechnik.de
www.herion-systemtechnik.de

A subsidiary of the Norgren and IMI group of companies

Distribution and Service

- in 75 countries through the Norgren service network

**HERION Systemtechnik
Sales Partners****China**

ESTUN INDUSTRIAL AUTOMATION CO., LTS
155, Jiangjun Road, Jiangning Economical & Technical
Development Zone, Nanjing, 211100 P.R.C.
Tel.: +86-25-52785915
E-Mail: info@estun.com
www.estun.com

Korea

CHUNGWOO CO., LTD.
416-4 Dokjeongri
Janganmyun Hwaseongsi
Kyungkido, Korea
Tel.: +82 (0)31 351-5340
E-Mail: blueox2@unitel.co.kr
www.chungwooco.co.kr

Spain

EUROTECH SYSTEMS, S.L.
Av. Can LLuch, 25
08690 SANTA COLOMA DE CERVELLO
Tel.: +34 93 634 0101
E-Mail: eurotech@eurotechsys.com
www.eurotechsys.com

South Africa

Ernest Lowe ELCO
Pneumatic & Hydraulic Automation Solutions
6, Skew Road, Boksburg North 1459,
Gauteng, South Africa
Tel.: +27 (11) 898-6600
E-Mail: corporate@elco.co.za
www.elco.co.za

OPTIMA HYDRAULICS (PTY) LTD.

Optima Business Park,
Kempentelt Road,
Paarden Eiland, 7420
Cape Town, South Africa
Tel.: +27(21)508-7200
E-Mail: info@optima.co.za
www.optima.co.za

Taiwan

Full Life Trading Co., Ltd.
16F-4, No.2, Jian Ba Rd. Chung Ho City
Taipei County, Taiwan 23562
Tel.: +886-2-82261860
E-Mail: sales-dept@fulllifetrading.com
www.fulllifetrading.com

Turkey

Power Pnomatik Proses A. Ş
Necatibey Cad. No:44/2
Karaköy
Ýstanbul 34420
Tel.: +90 212 2938870
E-Mail: info@powerpnomatik.com
www.powerpnomatik.com