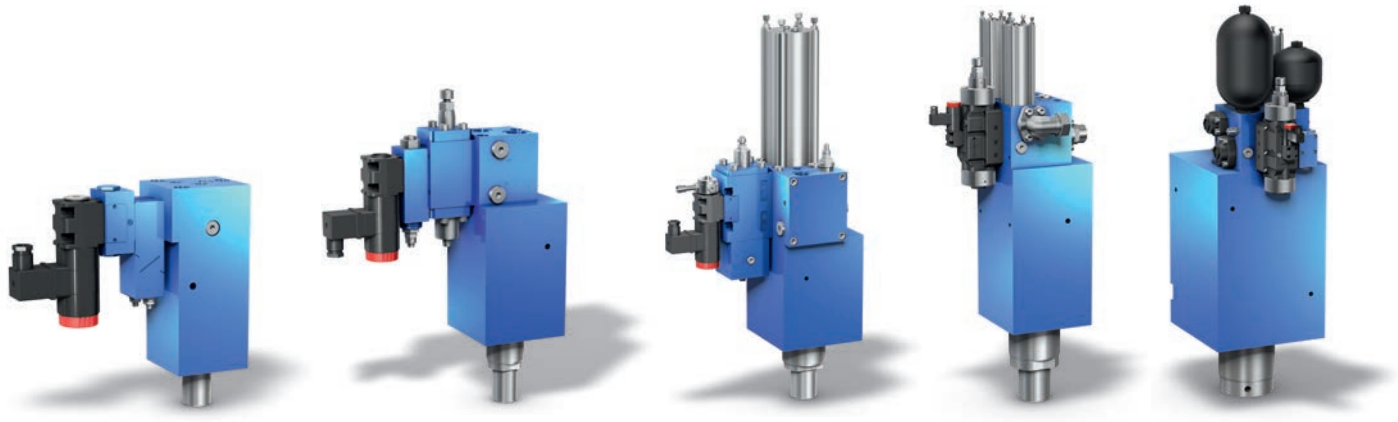
voith.com

Hydraulic stroke control units for punching, shearing and cutting machines

Product data sheet



Advantages

+ Highly dynamic and smooth stroke sequence
+ High availability and robustness
+ Stable TDC position without drift and exact BDC reversal
+ Application-specific design
+ Low electronic control effort

Design and mode of operation

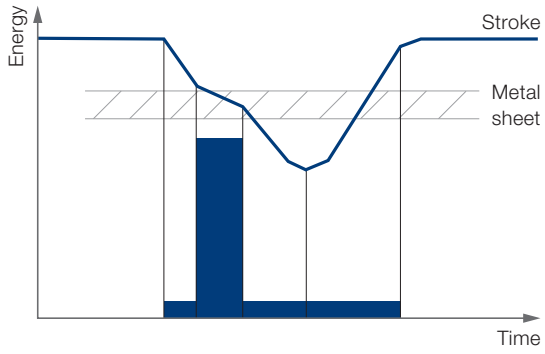
Voith stroke control units are modular, highly dynamic hydraulic control units. They consist of a hydraulic actuator with directly flange-mounted control block and, optionally, an application-optimized hydraulic power pack with efficient and robust internal gear pumps and an electronic control system. The attachment of all necessary valve components directly to the block cylinder offers a compact design and optimum power density, very high hydraulic stiffness of the actuator with low installation effort. The actuator is controlled by a stroke control valve. The basis for the stroke control valve is a hydraulically pilot-operated directional control valve, which is controlled by additional mechanical actuators. For stroke reversal in the BDC position, an optional electrical or mechanical valve actuation is available. The hydromechanical design of the stroke control unit provides an exact and drift-free TDC position, plus an almost delay-free and thus repeatable reversing process of the cylinder tappet at the lower reversing point. The hydromechanical control eliminates the need for measuring systems and electronic control concepts. This is the basis for system-typical properties such as high robustness and process reliability. Cylinder design, surface adaptation and installation conditions are directly adapted to the specific requirement profile of the applications.

Voith stroke control units offer highly dynamic motion sequences. The high performance, power and dynamics expected for punching machines are optimally met with the various drives. Voith stroke control units are very energy-efficient and require a low installed electrical power. This is due to the load-controlled two-pressure system and the accumulator operation. Integration and commissioning of the diecutting machines is simple and fast.

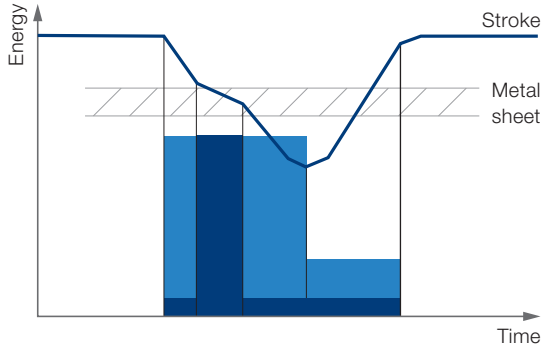
The electronic Voith controls for punching drives are the electronic link between the die drive and the machine control system. The electronic control effort is therefore very low. The optional HS2 electronic module reduces valve switching times to a minimum and enables monitoring of the stroke cycles.

Energy balance graphic

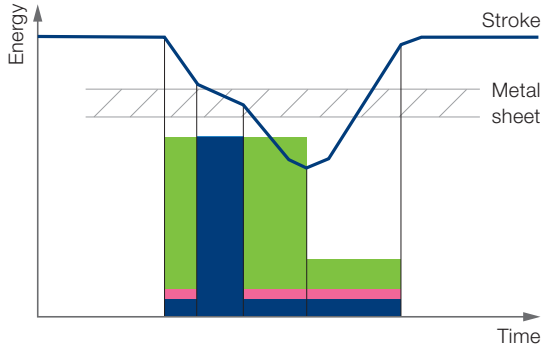
Theoretical energy demand during punch operation



One pressure system energy demand during punch operation



Two pressure system energy demand during punch operation



- Theoretical energy requirement
- Additional energy requirement of an one pressure system to the theoretical energy requirement
- Additional energy requirement of a two pressure system to the theoretical energy requirement
- Saved energy

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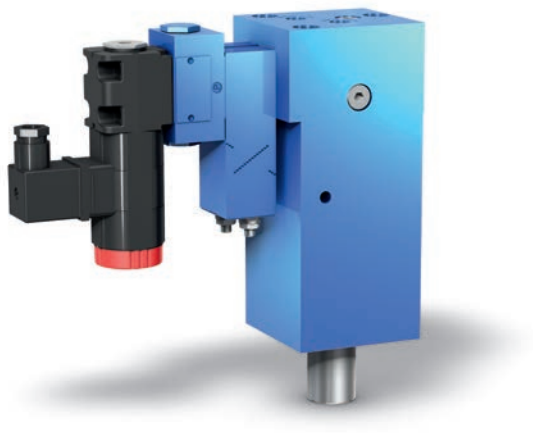
Hydraulic stroke control unit HZE NG 4

Options
- Variable speed
- Variable force
- Load holding
- Proportional technology

Electronic control (option)
- Linkage between machine control and HZE
- Stroke cycle monitoring
- Switching time acceleration

Applications
- Punching/shearing/cutting
- Stamping/forming
- Positioning
- Clamping
- Ejection

Hydraulic stroke control unit HZE NG 4



Technical data

General

Ram force	10 to 200 kN (standard series)
Ram return force	approx. 50% ram force
Ambient temperature	-5 to +50 °C
Mounting position	mountable in any position

Hydraulic

Operating pressure	max. 250 bar
Hydraulic oil temperature	-10 to +70 °C
Viscosity range	10 to 300 mm^2/s

Electric

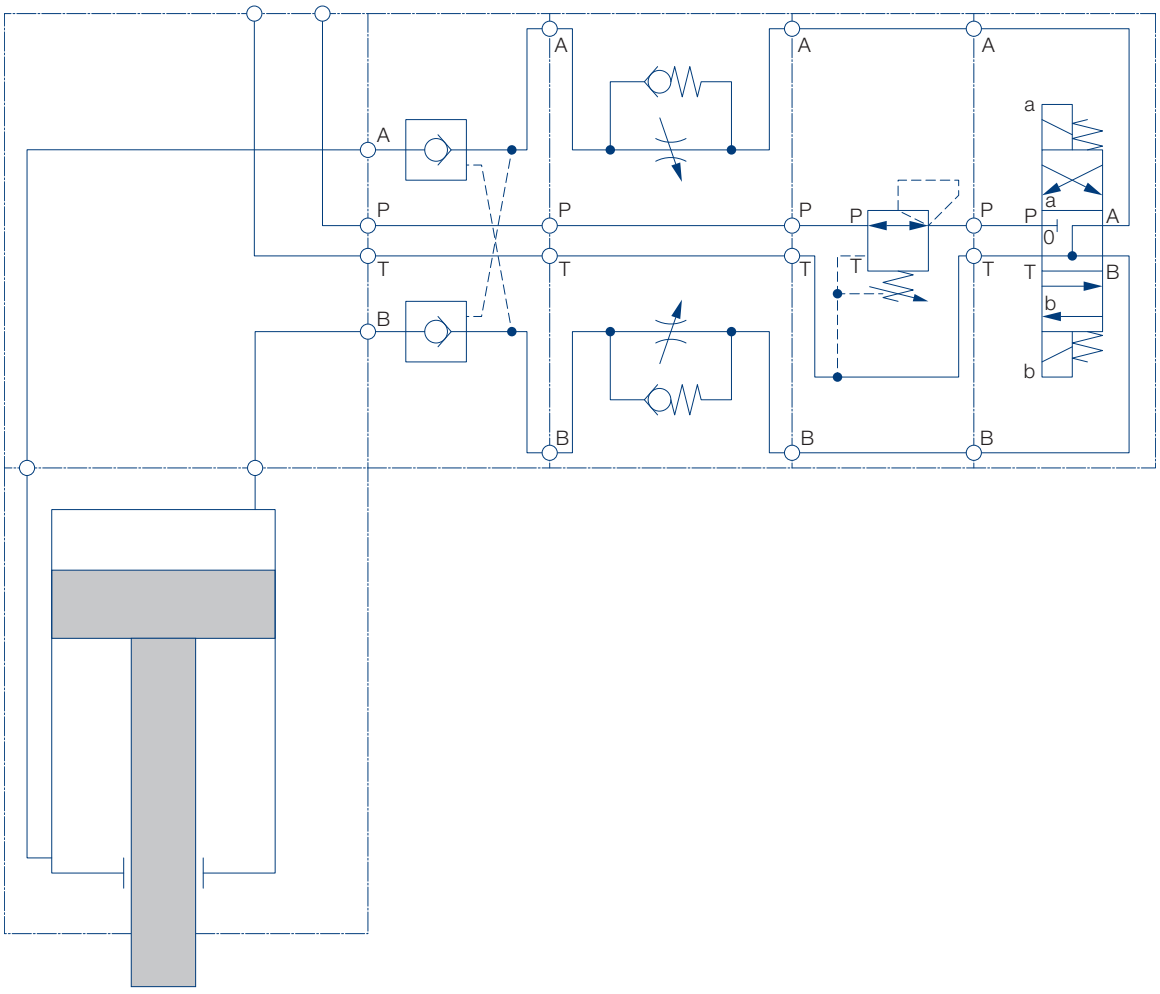
Valve voltage (±10%)	24 V DC
Switching time “Start”	17 ms
Valve switching time from “bdc”	17 ms
Power consumption P20	20 W
System of protection DIN 40050	IP65 with valve plug connected

Further specific performance data according to computation minutes.

Examples of applications

Application	Specific performance
Clamping cylinder	• Clamping force: 70 kN • Total cycle time at 10 mm stroke: 40 ms
Wire cutting machine	• Cutting force: 20 kN • Total cycle time at 12 mm stroke: 35 ms

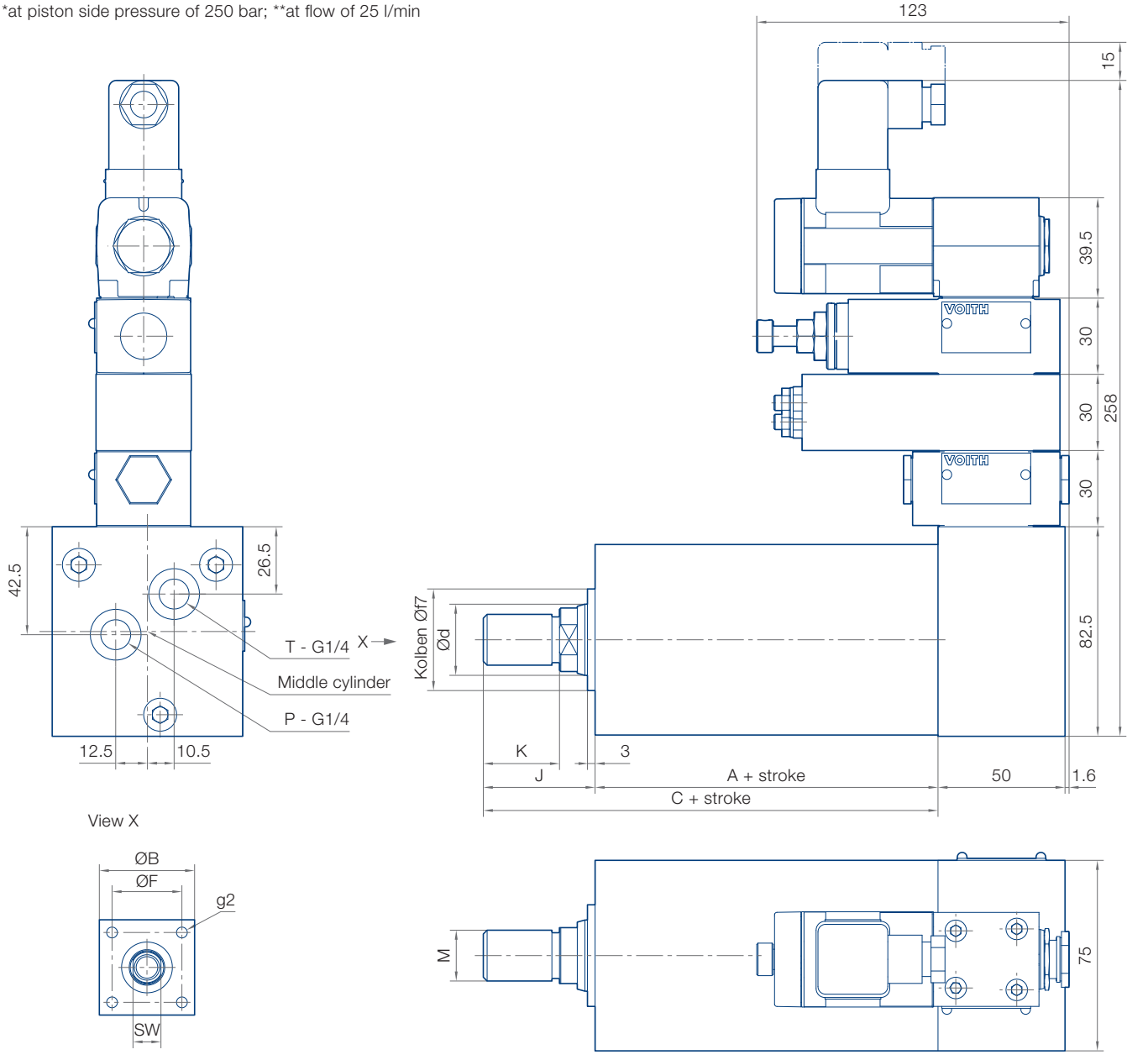
Hydraulic circuit



Basic dimensional drawing

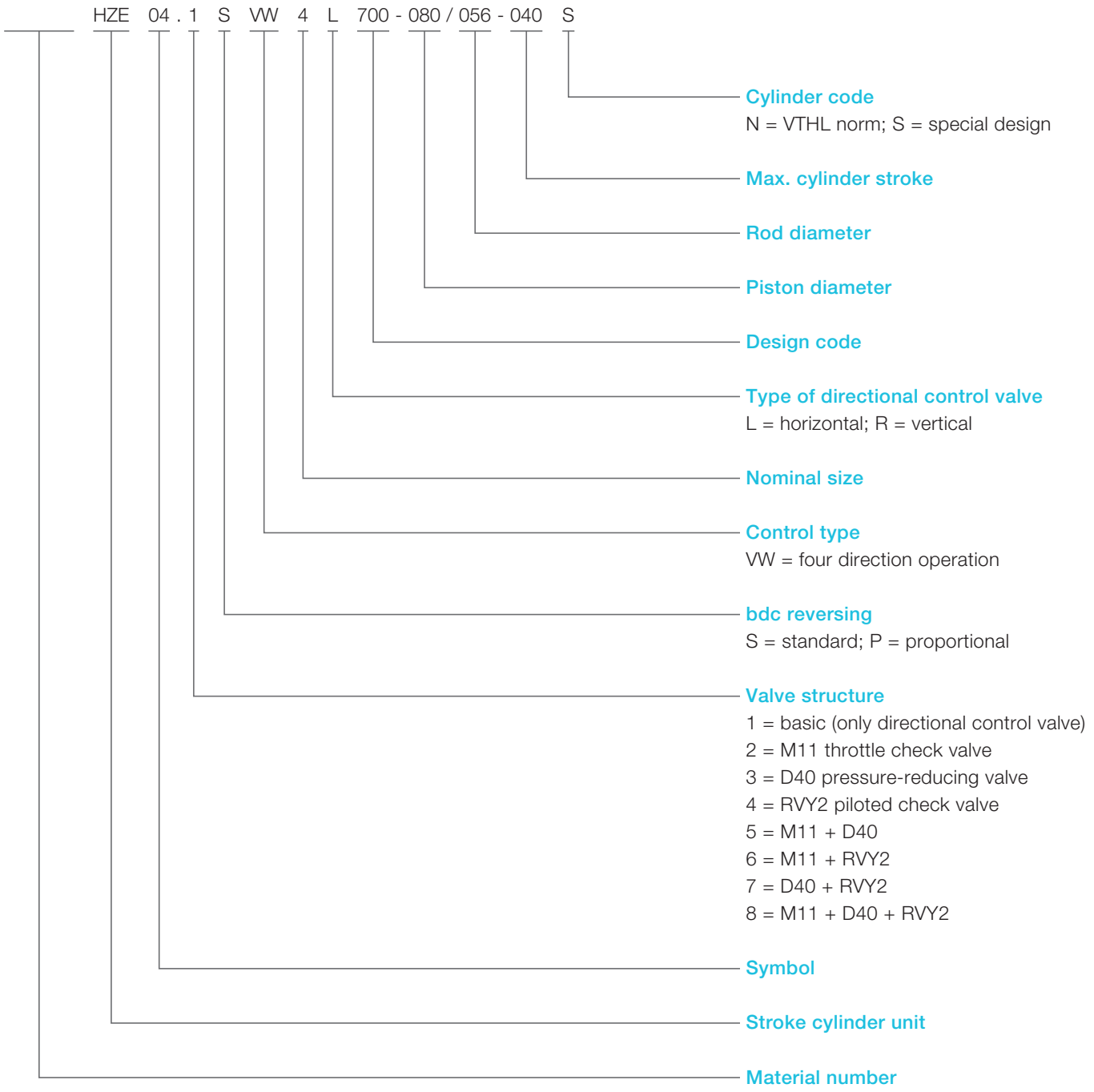
Force* [kN]	v** [mm/s]	Ø Kolben [mm]	Ø d [mm]	A [mm]	B [mm]	C [mm]	F [mm]	J [mm]	K [mm]	M [mm]	SW [mm]	g2 [mm]
30	330	40	28	90	75	134	55	44	30	M20x1.5	22	M10
50	210	50	35	98	90	153	65	55	35	M27x2	27	M12
80	130	63	45	120	105	182	70	62	42	M30x2	36	M16
125	80	80	56	135	125	210	90	75	50	M42x2	46	M16
200	50	100	70	190	150	280	110	90	60	M48x2	60	M20

Other cylinder dimensions on request; all dimensions in mm
*at piston side pressure of 250 bar; **at flow of 25 l/min



All dimensions in mm

Type code


HZE 04 . 1 S VW 4 L 700 - 080 / 056 - 040 S
Cylinder code
N = VTHL norm; S = special design
Max. cylinder stroke
Rod diameter
Piston diameter
Design code
Type of directional control valve
L = horizontal; R = vertical
Nominal size
Control type
VW = four direction operation
bdc reversing
S = standard; P = proportional
Valve structure
1 = basic (only directional control valve)
2 = M11 throttle check valve
3 = D40 pressure-reducing valve
4 = RVY2 piloted check valve
5 = M11 + D40
6 = M11 + RVY2
7 = D40 + RVY2
8 = M11 + D40 + RVY2
Symbol
Stroke cylinder unit
Material number

Hydraulic stroke control unit HSE NG 6

Features

- Highly dynamic punching and shearing drive for shortest cycle time
- Smooth stroke operation via hydraulically damped cylinder ram
- Stable top dead center position without drift
- Exact bottom dead center reversing for process-safe stroke operation
- Manually adjustable stroke positions; optionally electrical
- Simple functions with robust valve technique
- Monitored processes with low control complexity

Options

- Stroke control units NG 10 and NG 25 for higher force range
- Stroke control unit HSP for programmable stroke positions
- Complete punching systems

Electronic control (option)

The ram control units HSE are delivered with an electronic control, the link between hydraulics and machine control. This control is adapted to the application. Please refer to the technical data from the data sheet of the electronic control.

Applications

- Punching/nibbling
- Shearing/cutting
- Stamping

Technical data

General

Ram force	10 to 200 kN (standard series)
Ram return force	approx. 50% ram force
Operating force tdc	250 N at 80 bar control pressure
Operating force bdc	150 N (at mechanical bdc reversal)
Ambient temperature	-5 to +50 °C
Mounting position	mountable in any position

Hydraulic

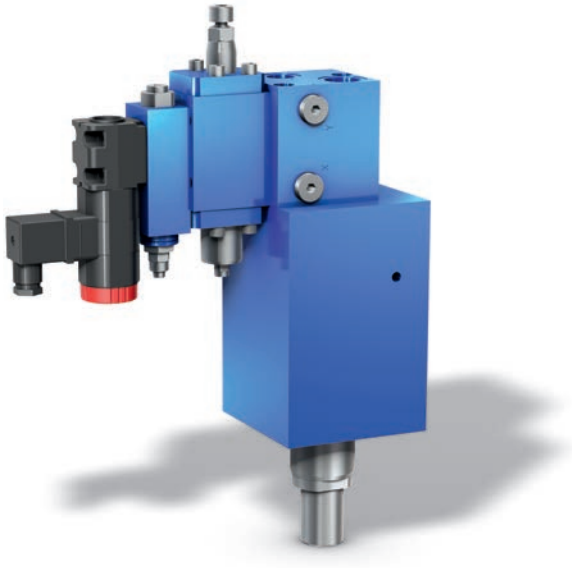
Operating pressure	max. 250 bar
Control pressure	80 bar; max. 160 bar
Hydraulic oil temperature	-10 to +70 °C
Viscosity range	10 to 300 mm^2/s

Electric

Valve control	Voith Hubsteuerung HS2
Valve voltage (±10%)	24 V DC
Switching time “Start”	8 ms
Valve switching time from “bdc”	7 ms
Power consumption P20	20 W
System of protection DIN 40050	IP65 bei gestecktem Ventilstecker

Further specific performance data according to computation minutes.

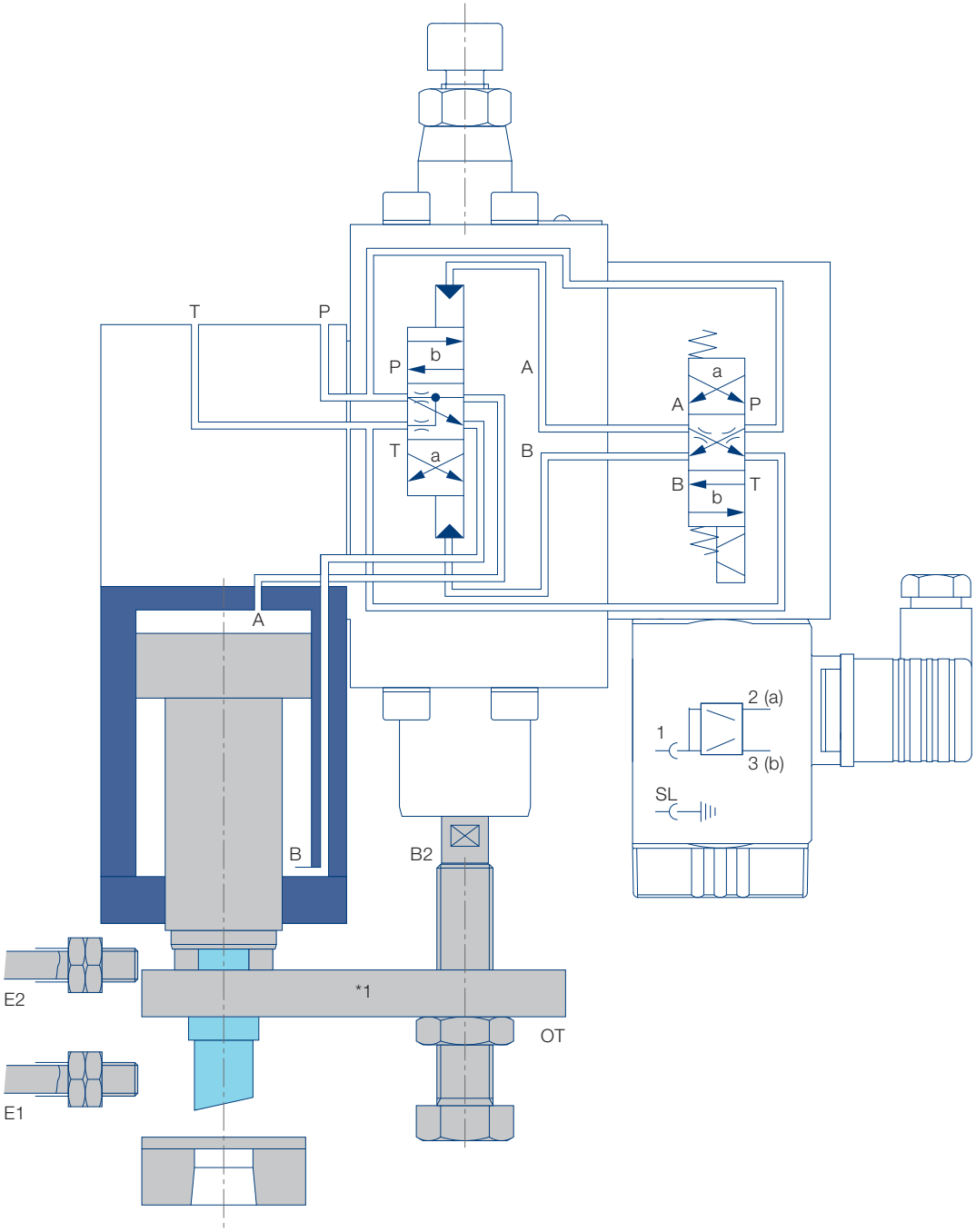
Hydraulic stroke control unit HSE NG 6



Examples of applications

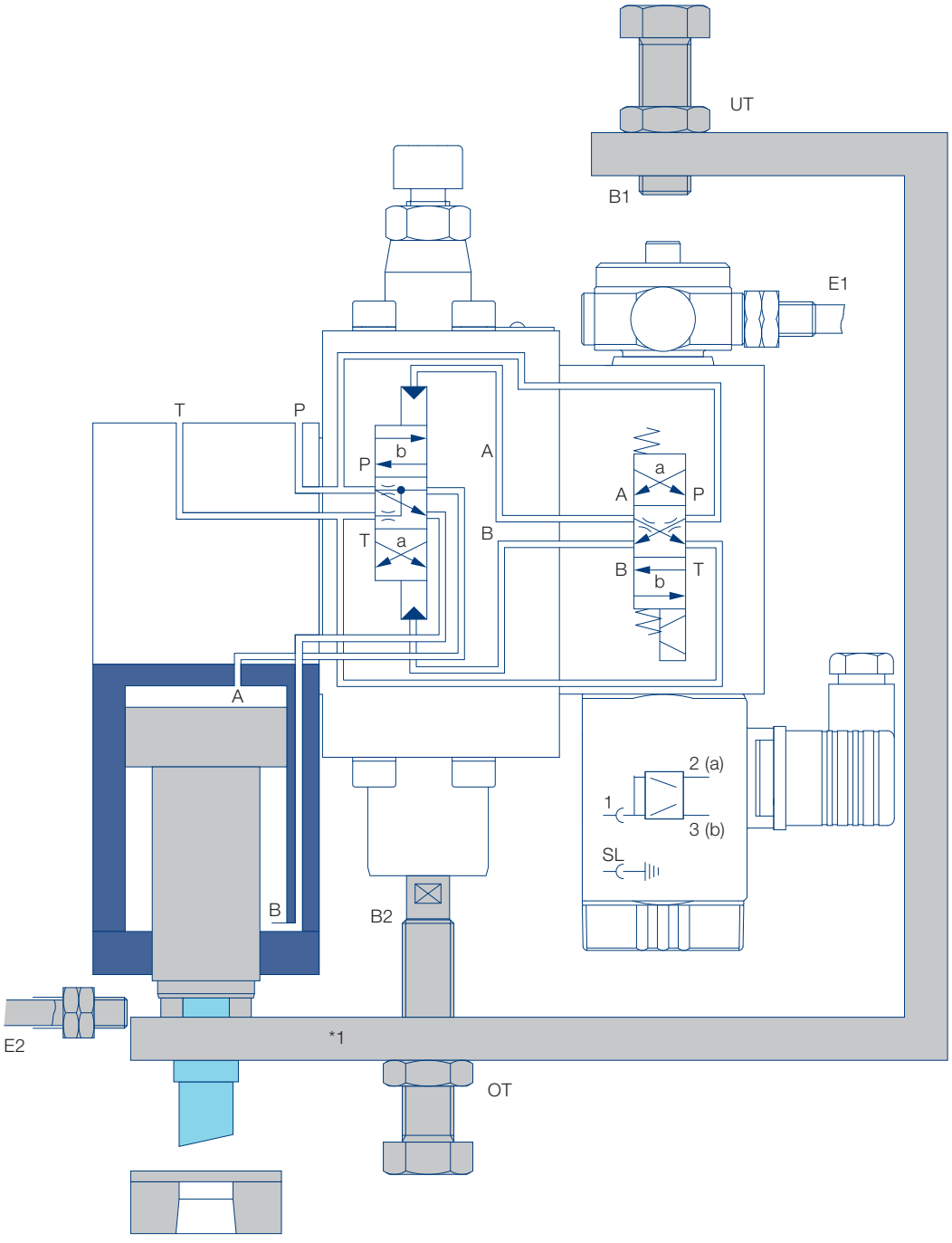
Application	Specific performance
Punching drive	• Punching force: 70 kN • Total cycle time at 10 mm stroke: 40 ms
Wire cutting machine	• Shearing force: 20 kN • Total cycle time at 12 mm stroke: 35 ms

Functional diagram with electric bottom dead center reversing



Proximity switch E1 and E2 and the mechanical parts *1 are not scope of delivery.

Functional diagram with mechanic bottom dead center reversing

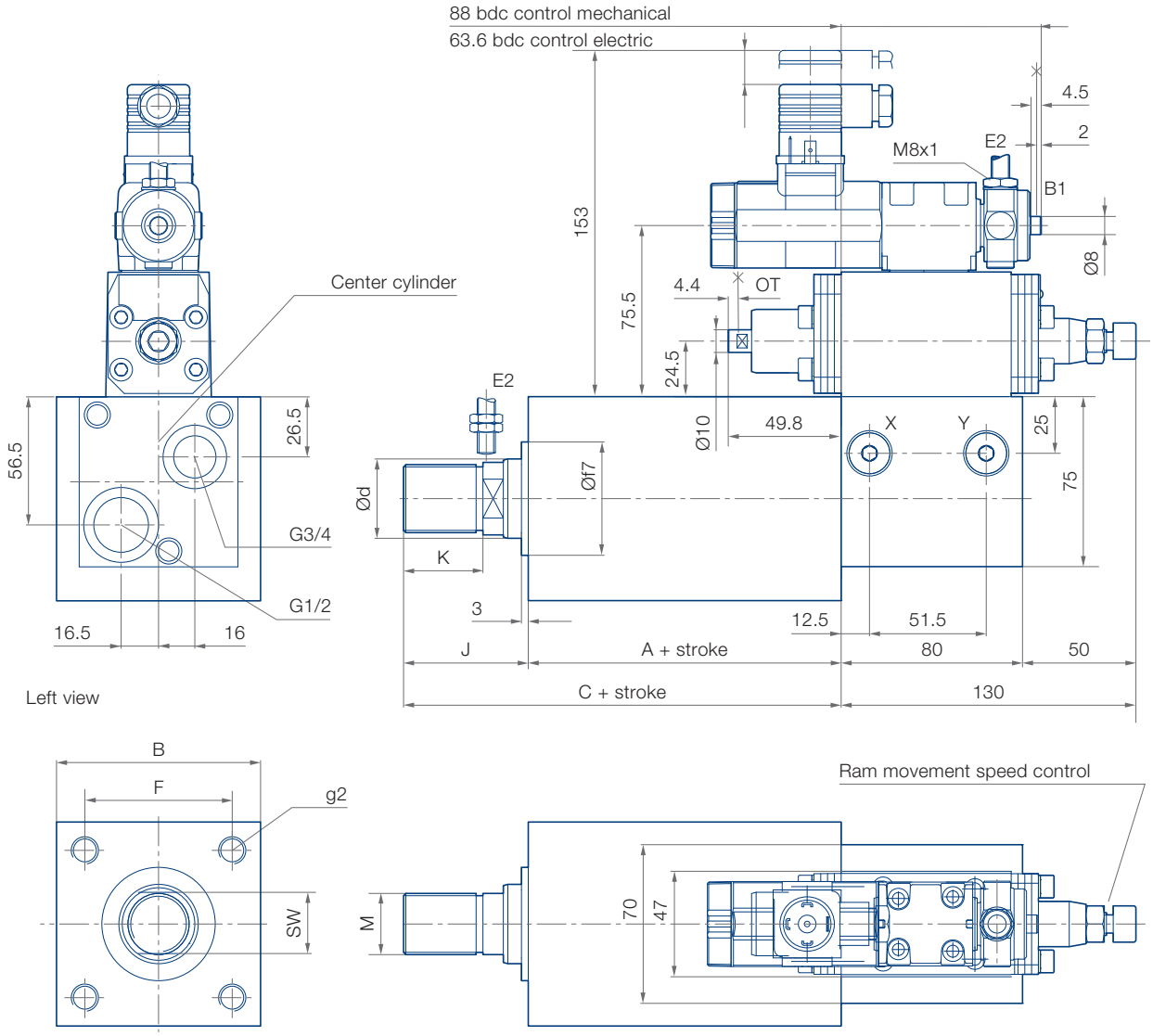


Proximity switch E2 and the mechanical parts
*1 are not scope of delivery.

Basic dimensional drawing

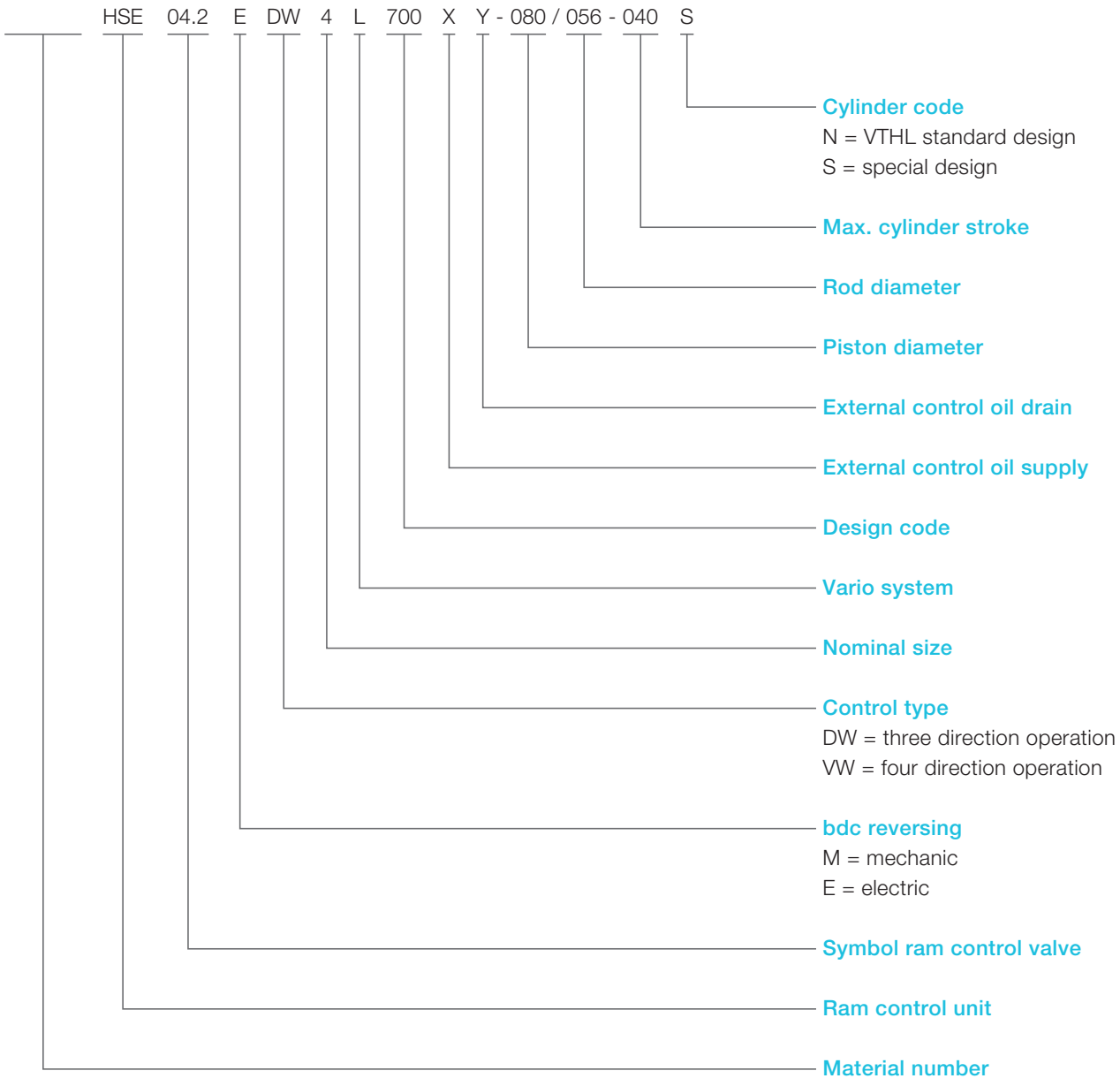
Ø Rod [mm]	Ø d [mm]	A [mm]	B [mm]	C [mm]	F [mm]	J [mm]	K [mm]	M [mm]	SW [mm]	g2 [mm]
40	28	90	75	134	55	44	30	M20x1.5	22	M10
50	45	98	90	153	65	55	35	M27x2	27	M12
63	56	120	105	182	70	62	42	M30x2	36	M16
80	70	135	125	210	90	75	50	M42x2	46	M16
100	90	190	150	280	110	90	60	M48x2	60	M20

Further cylinder dimensions on request; all dimensions in mm



All dimensions in mm

Type code


HSE 04.2 E DW 4 L 700 X Y - 080 / 056 - 040 S
Cylinder code
N = VTHL standard design
S = special design
Max. cylinder stroke
Rod diameter
Piston diameter
External control oil drain
External control oil supply
Design code
Vario system
Nominal size
Control type
DW = three direction operation
VW = four direction operation
bdc reversing
M = mechanic
E = electric
Symbol ram control valve
Ram control unit
Material number

Hydraulic stroke control unit HSE NG 10

Features

- Highly dynamic punching and shearing drive for shortest cycle time
- Smooth stroke operation via hydraulically damped cylinder ram
- Stable tdc position without drift
- Exact bdc reversing for process-safe stroke operation
- Manually adjustable stroke positions; optionally electrical
- Simple functions with robust valve technique monitored processes with low control complexity

Options

- Stroke control units NG 6 and NG 25 for lower or higher force range
- Stroke control unit HSP for programmable stroke positions
- Complete punching systems

Electronic control (option)

The ram control units HSE are delivered with an electronic control, the link between hydraulics and machine control. This control is adapted to the application. Please refer to the technical data from the electronic control data sheet:
Electronic control HS2 – data sheet 911 or HS3 – data sheet 912.

Applications

- Punching/nibbling
- Shearing/cutting
- Stamping

Technical data

General

Ram force	10 to 630 kN (standard series)
Ram return force	approx. 50% ram force
Operating force tdc	400 N at 80 bar control pressure
Operating force bdc	150 N (at mechanical bdc reversal)
Ambient temperature	-5 to +50 °C
Mounting position	mountable in any position

Hydraulic

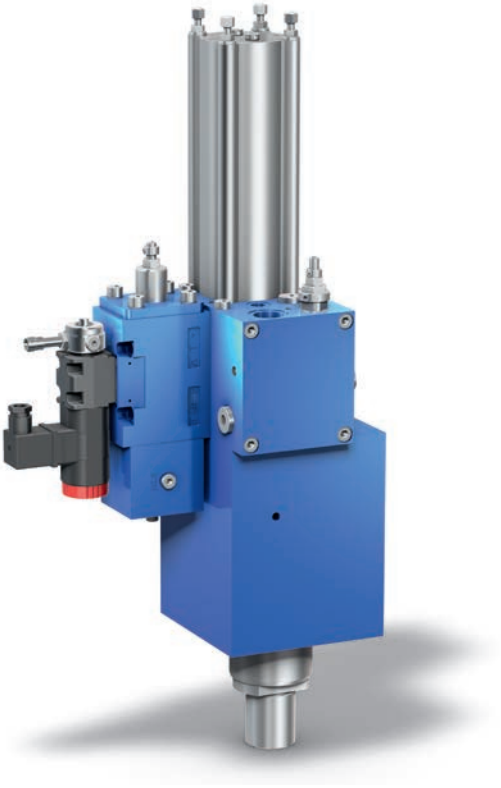
Operating pressure	max. 250 bar
Control pressure	40 to 80 bar; max. 250 bar
Hydraulic oil temperature	-10 to +70 °C
Viscosity range	10 to 300 mm^2/s

Electric

Valve control	Voith stroke control HS2 (data sheet: 911)
Valve voltage (±10%)	24 V DC
Switching time “Start”	8 ms (HS2)
Valve switching time from “bdc”	7 ms (HS2)
Power consumption P20	20 W
System of protection DIN 40050	IP65 with valve plug connected

Further specific performance data according to computation minutes.

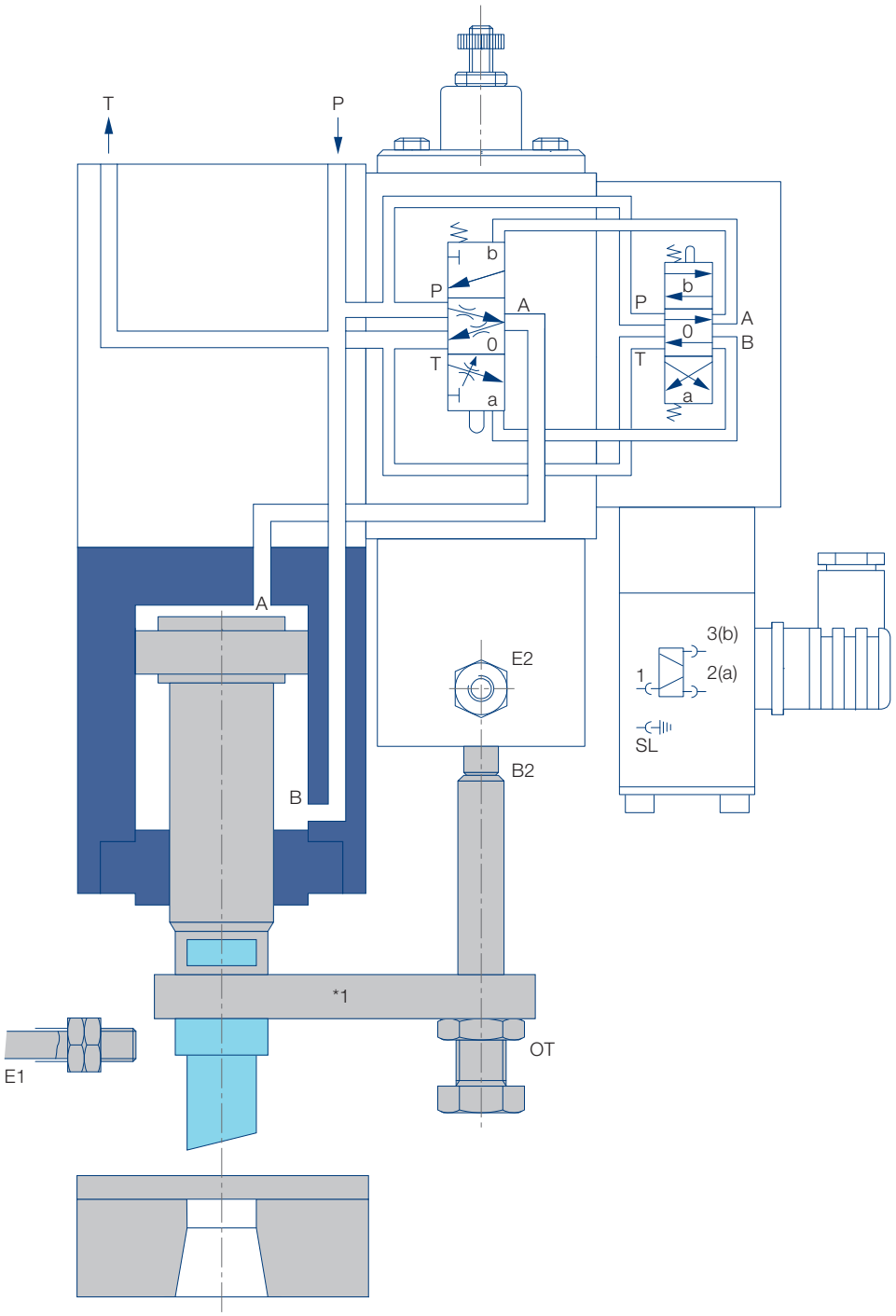
Hydraulic stroke control unit HSE NG 10



Examples of applications

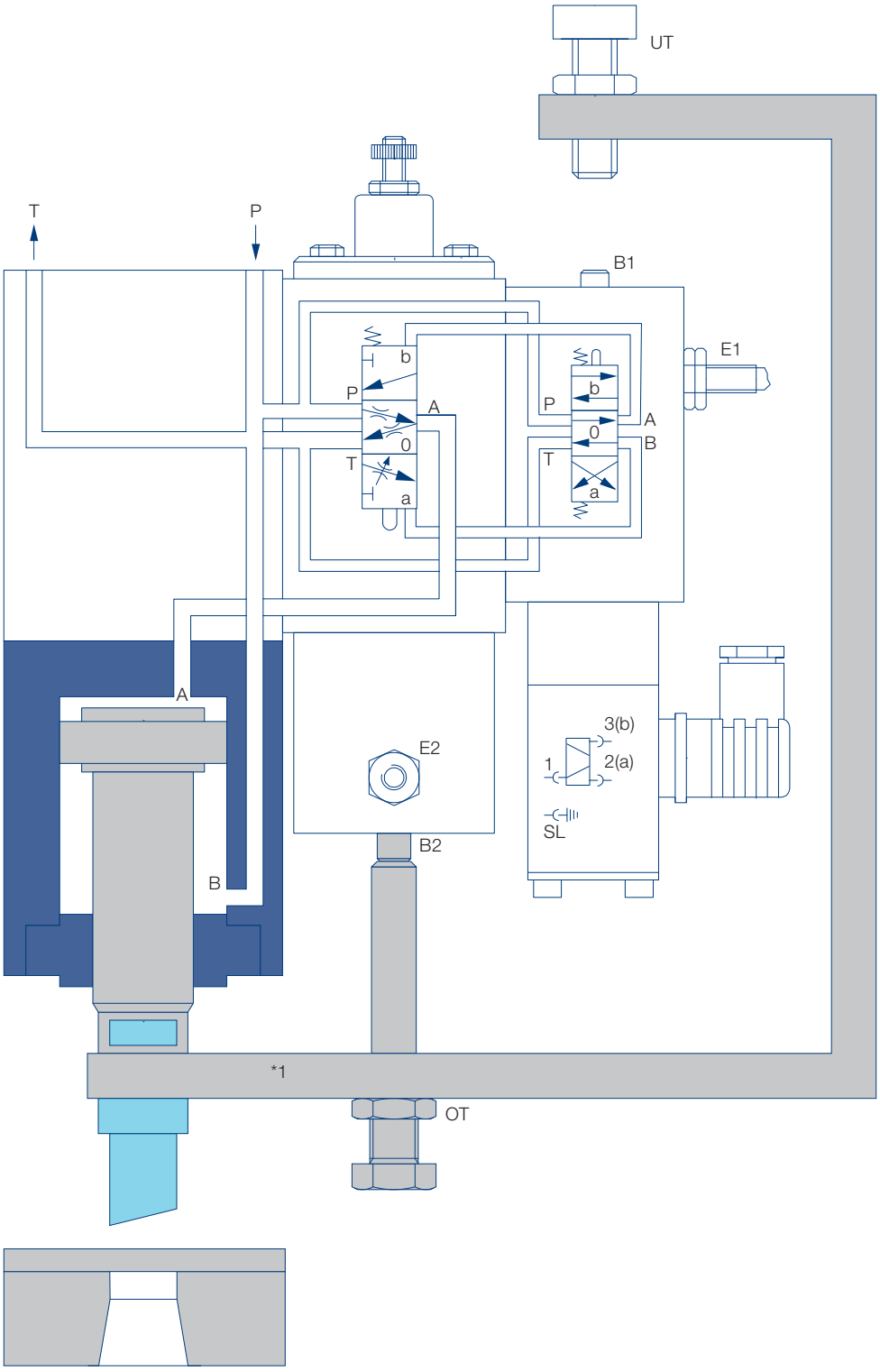
Application	Specific performance
Punching and nibbling machine	• Punching force: 200 kN • Total cycle time at 6 mm stroke: 40 ms
Section shearing machine	• Shearing force: 150 kN • Total cycle time at 10 mm stroke: 60 ms
Pipe cutting machine	• Shearing force: 100 kN • Total cycle time at 14 mm stroke: 40 ms

Functional diagram with electric bottom dead center reversing



Proximity switch E1 and the mechanical parts *1 are not scope of delivery.

Functional diagram with mechanic bottom dead center reversing

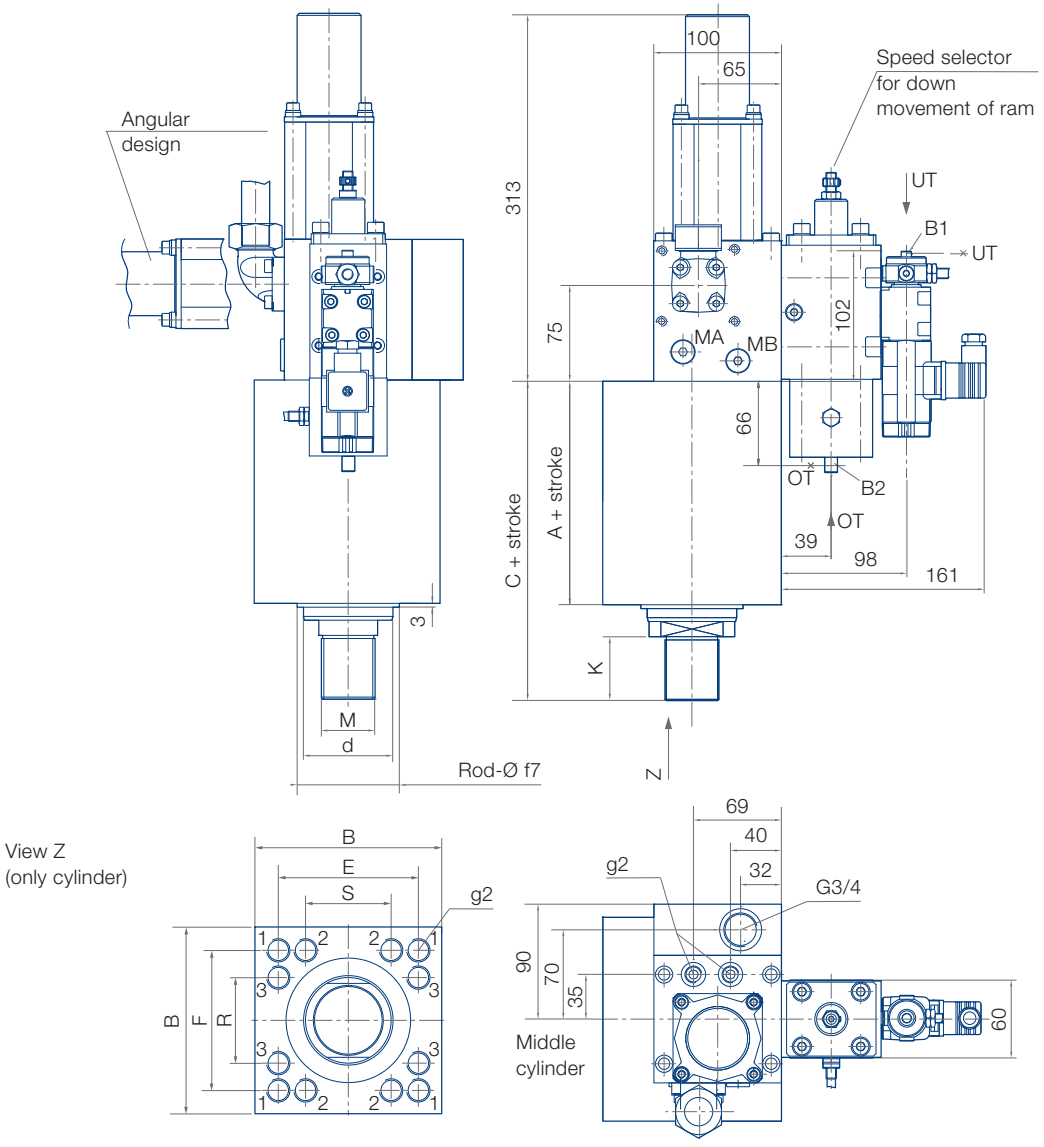


Mechanical parts *1 are not scope of delivery.

Basic dimensional drawing

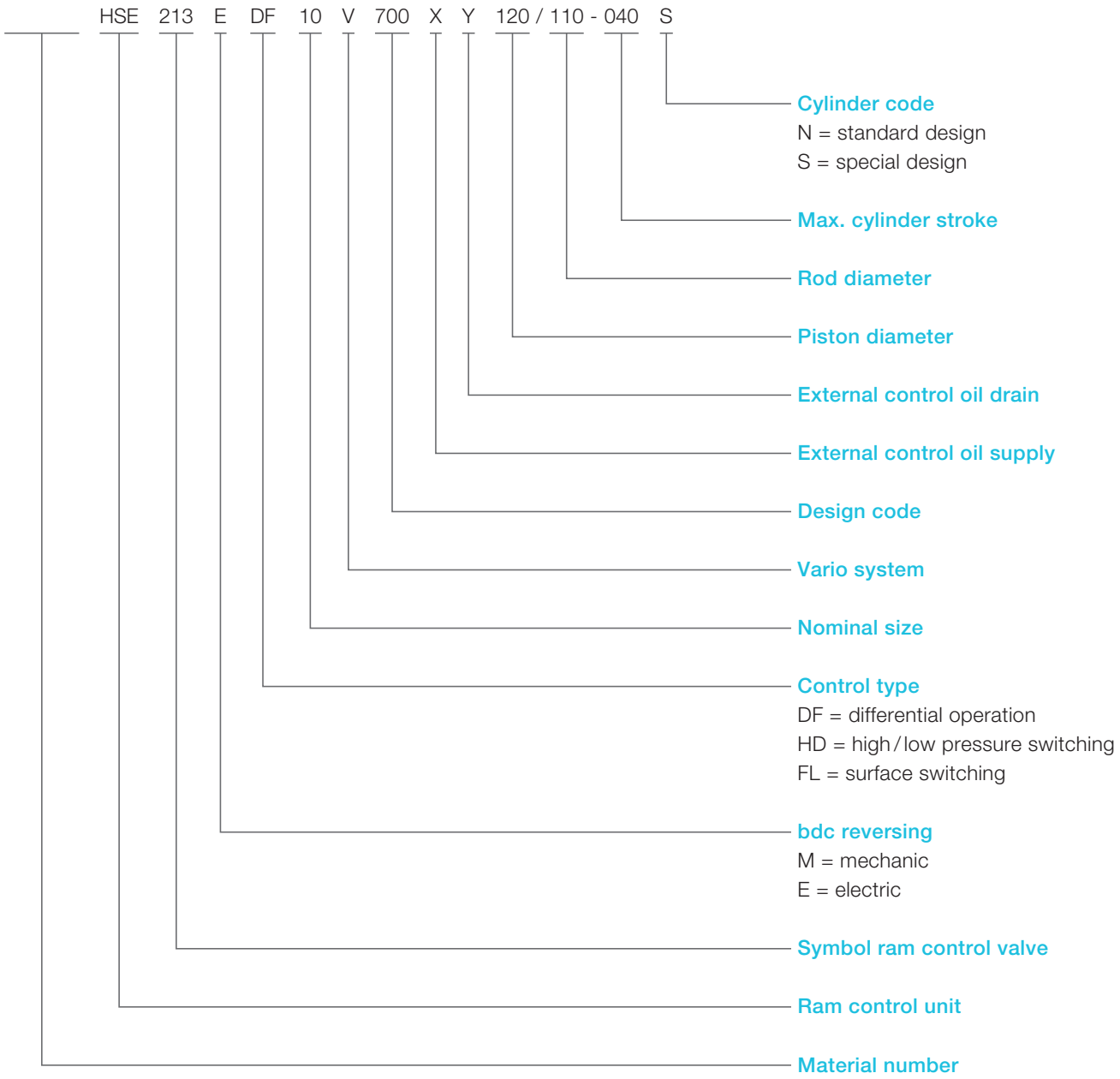
Ø Rod [mm]	Ø d [mm]	A [mm]	B [mm]	C [mm]	E [mm]	F [mm]	K [mm]	M [mm]	g2 (position) [mm]	R [mm]	S [mm]
50	35 / 45	98	100	153	75	75	35	M27x2	4 x M12 (1)	–	–
63	45 / 56	120	110	182	80	80	42	M30x2	4 x M16 (1)	–	–
80	45 / 56	135	140	210	100	100	50	M42x2	4 x M16 (1)	–	–
100	70 / 90	190	160	280	110	110	60	M48x2	4 x M20 (1)	–	–
120	85 / 110	215	180	325	130	130	80	M64x3	4 x M24 (1)	–	–
140	100 / 130	220	210	350	160	160	90	M80x3	4 x M30 (1)	–	–
160	115 / 145	240	240	390	180	180	100	M90x3	4 x M30 (1)	–	–
180	125 / 160	260	280	410	230	230	100	M100x3	8 x M27 (2/3)	120	120

Further cylinder dimensions on request; all dimensions in mm



All dimensions in mm

Type code


HSE 213 E DF 10 V 700 X Y 120 / 110 - 040 S
Cylinder code
N = standard design
S = special design
Max. cylinder stroke
Rod diameter
Piston diameter
External control oil drain
External control oil supply
Design code
Vario system
Nominal size
Control type
DF = differential operation
HD = high / low pressure switching
FL = surface switching
bdc reversing
M = mechanic
E = electric
Symbol ram control valve
Ram control unit
Material number

Hydraulic stroke control unit HSE NG 25

Features

- Highly dynamic punching and shearing drive for shortest cycle time
- Smooth stroke operation via hydraulically damped cylinder ram
- Stable tdc position without drift
- Exact bdc reversing for process-safe stroke operation
- Manually adjustable stroke positions; optionally electrical
- Simple functions with robust valve technique
- Monitored processes with low control complexity

Options

- Ram control units NG 6 and NG 10 for lower force range
- Ram control unit HSP for programmable stroke positions
- Complete punching systems

Applications

- Punching/nibbling
- Shearing/cutting
- Stamping

Technical data

General

Ram force	up to 2 000 kN (standard series)
Ram return force	approx. 20% ram force
Operating force tdc	450 N at 80 bar control pressure
Operating force bdc	150 N (at mechanical bdc reversal)
Ambient temperature	-5 to +50 °C
Mounting position	mountable in any position

Hydraulic

Operating pressure	max. 250 bar
Control pressure	80 bar
Hydraulic oil temperature	-10 to +70 °C
Viscosity range	10 to 300 mm^2/s

Electric

Valve control	Voith stroke control HS2 (data sheet: 911)
Valve voltage (±10%)	24 V DC
Switching time “Start”	8 ms (HS2)
Valve switching time from “bdc”	7 ms (HS2)
Power consumption P20	20 W
System of protection DIN 40050	IP65 with valve plug connected

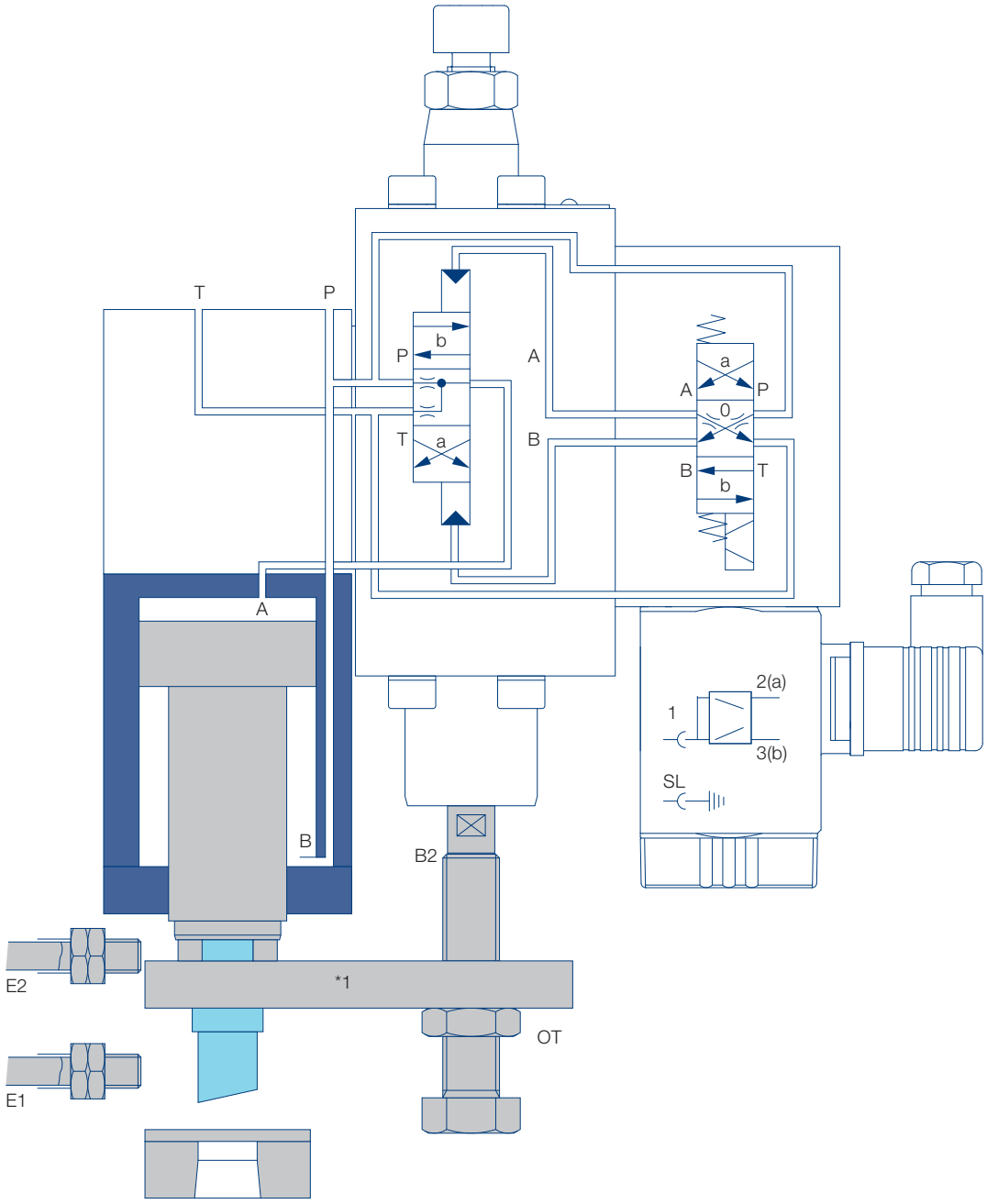
Further specific performance data according to computation minutes.

Hydraulic stroke control unit HSE NG 25

Examples of applications

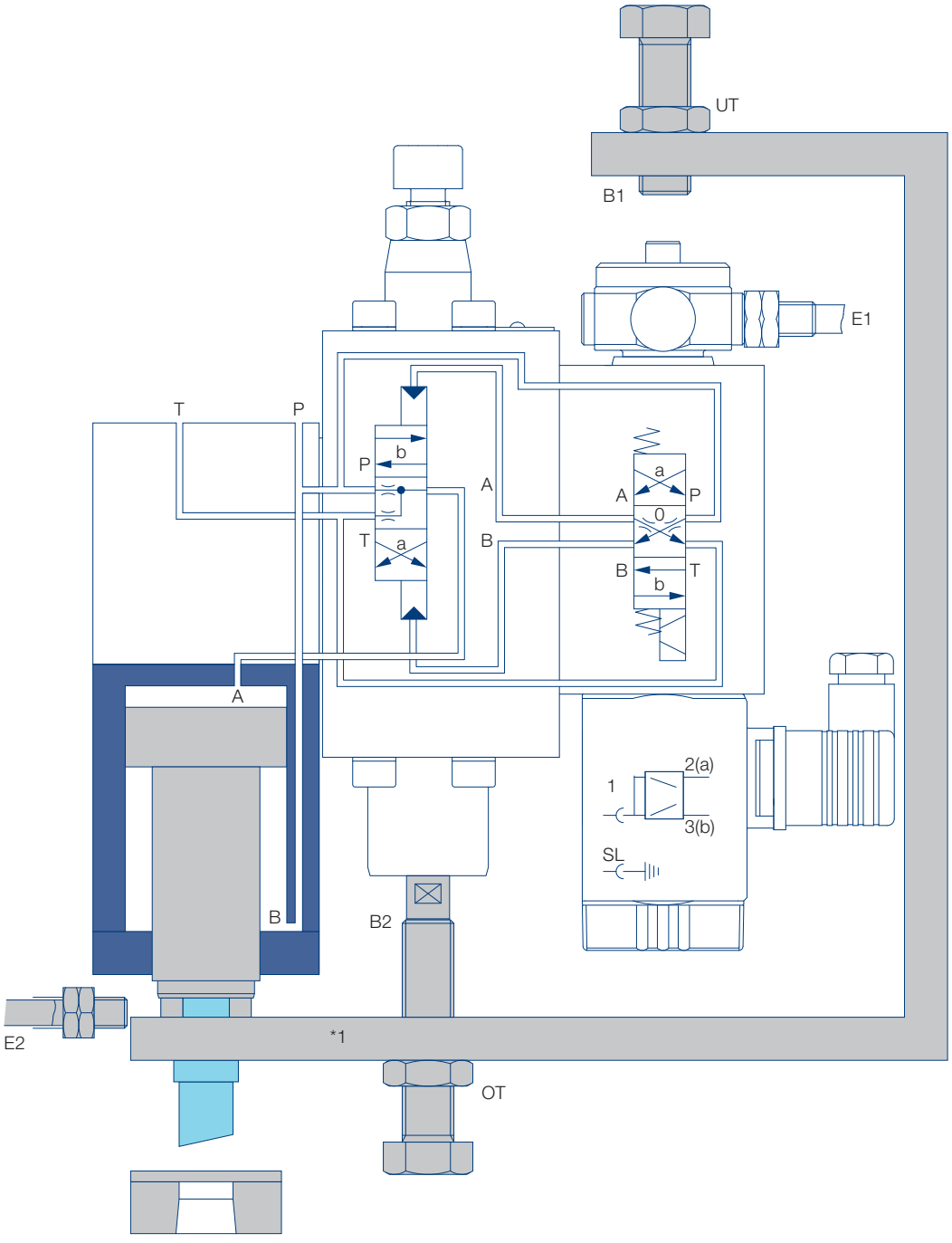
Application	Specific performance
Linear punching installation	• Punching force: 1 600 kN • Total cycle time at 6 mm stroke: 125 ms
Section shearing machine	• Shearing force: 800 kN • Total cycle time at 100 mm stroke: 860 ms

Functional diagram with electric bottom dead center reversing



Mechanical parts *1 no scope of delivery
Proximity switch E1, E2 no scope of delivery

Functional diagram with mechanic bottom dead center reversing

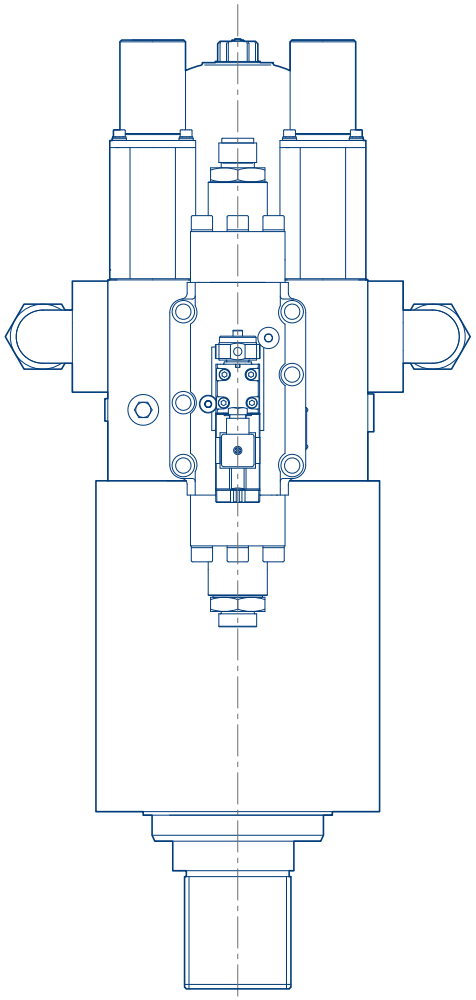


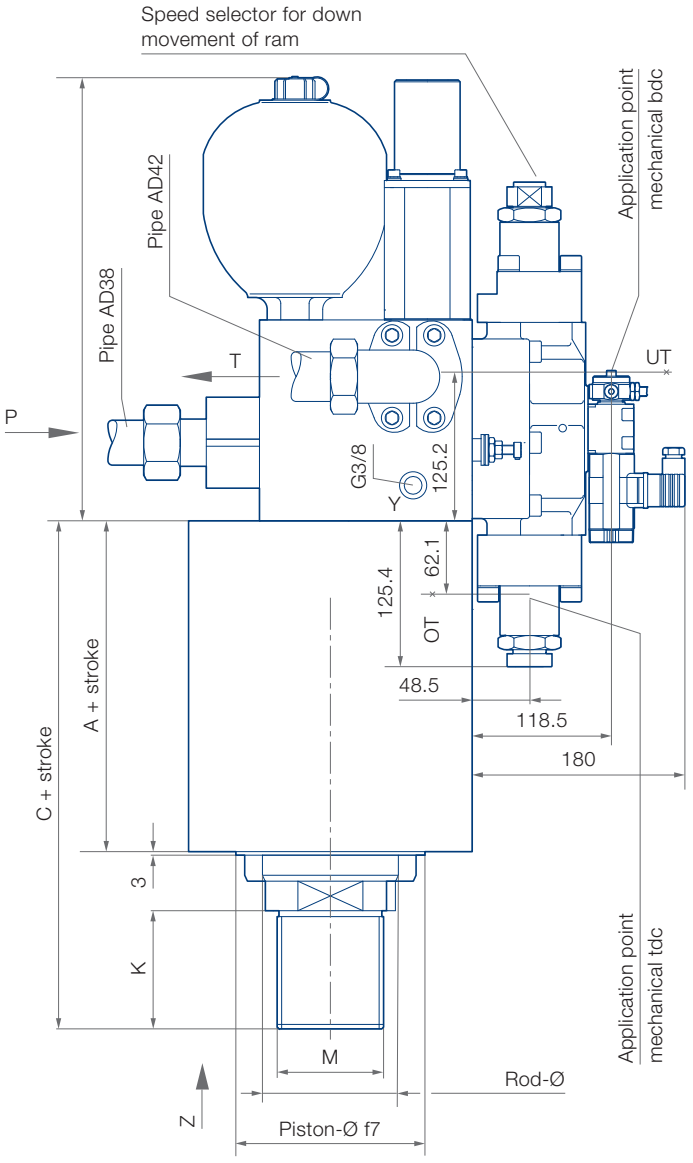
Mechanical parts *1 no scope of delivery
Proximity switch E2 no scope of delivery

Basic dimensional drawing

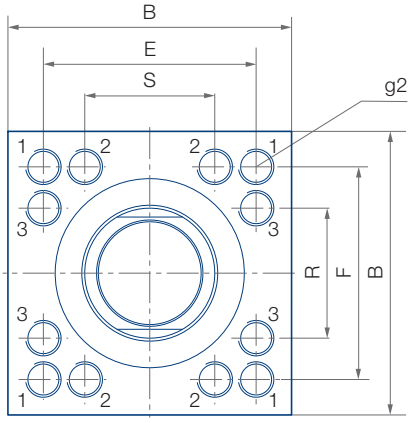
Ø Piston [mm]	Ø Rod [mm]	Wall thick-ness [mm]	A [mm]	B [mm]	C [mm]	E [mm]	F [mm]	K [mm]	M [mm]	g2 (position) [mm]	R [mm]	S [mm]
120	110	–	215	*	325	130	130	80	M64x3	4 x M24 (1)	–	–
140	130	–	220	*	350	160	160	90	M80x3	4 x M30 (1)	–	–
160	145	40	240	240	390	180	180	100	M90x3	4 x M30 (1)	–	–
180	160	50	260	280	410	210	210	100	M100x3	8 x M27 (2/3)	120	120
200	180	60	280	320	430	260	260	100	M120x3	8 x M30 (2/3)	140	140
220	200	60	300	340	450	270	270	100	M140x3	8 x M30 (2/3)	150	150
240	220	60	320	360	490	280	280	120	M150x3	8 x M36 (2/3)	160	160
260	240	70	380	400	540	310	310	140	M160x3	8 x M36 (2/3)	180	180
280	255	80	420	440	610	340	340	140	M170x3	8 x M42 (2/3)	200	200
300	270	75	460	450	680	350	350	150	M180x3	12 x M36 (1 2/3)	200	200
320	290	90	460	500	710	400	400	180	M220x3	12 x M36 (1 2/3)	225	225
340	310	95	500	530	760	430	430	180	M240x3	12 x M42 (1 2/3)	255	255
360	330	120	530	600	800	500	500	200	M250x3	12 x M42 (1 2/3)	300	300

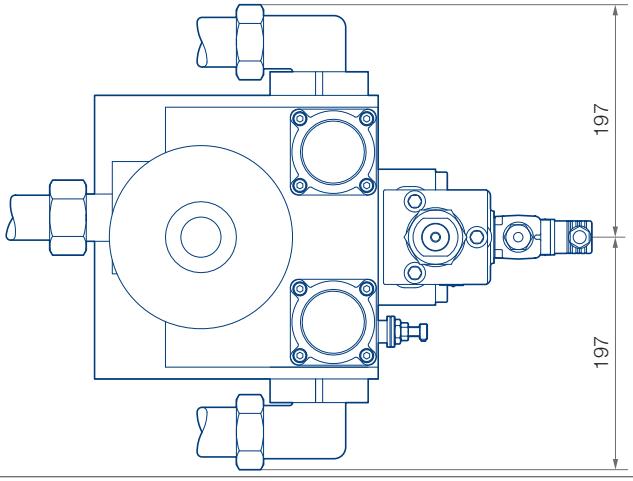
Further cylinder dimensions on request; all dimensions in mm
* Cylinder rectangular, dimension B: 180 and 210





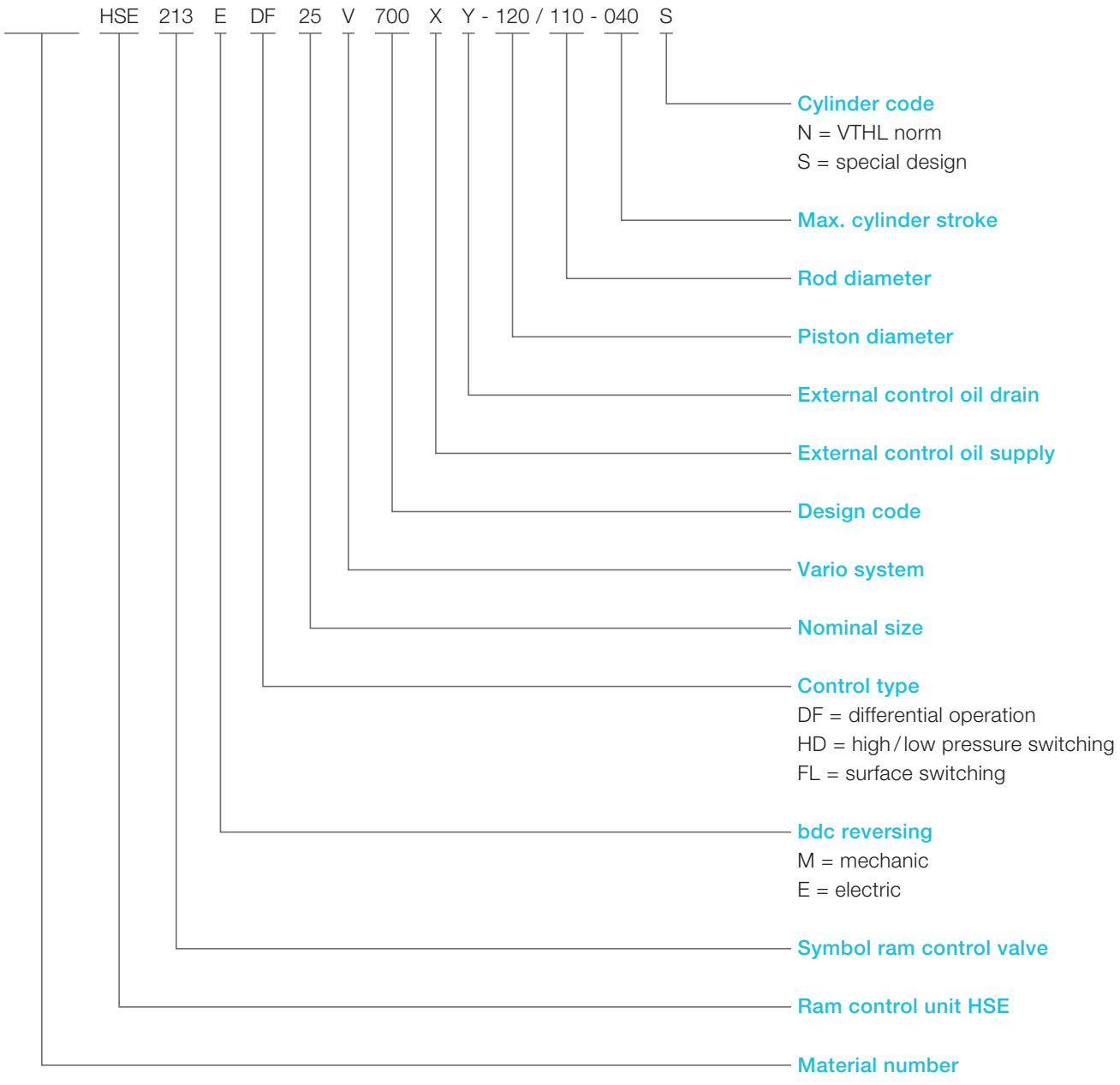
View Z (only cylinder)





All dimensions in mm

Type code



Electronic control

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Electronic control	Data sheet
HS2	9.1.1
HS3	9.1.2

Hydraulic stroke control unit HSE NG 25 GT

Features

- Highly dynamic punching drive for shortest cycle time
- Smooth stroke operation via hydraulically damped cylinder ram
- Stable tdc position without drift
- Exact bdc reversing for process-safe stroke operation
- Manually adjustable stroke positions; optionally electrical (HSP)
- Simple functions with robust valve technique
- Monitored processes with low control complexity

Options

- Ram control unit NG 10 HSE/GT for lower force range
- Ram control unit HSP for programmable stroke positions
- Complete punching systems including power pack technique
- Additional cylinder stroke lengths

Technical data

General

Operating force tdc	> 800 N
Cylinder stroke standard	180 mm
Ambient temperature	-5 to +50 °C
Mounting position	mountable in any position

Hydraulic

System pressure, low pressure circuit	80 bar
System pressure, high pressure circuit	260 bar
Hydraulic oil temperature, operating range	-10 to +70 °C
Hydraulic oil temperature, performance range	+10 to +60 °C
Viscosity range	10 to 300 mm^2/s

Electric

Valve control	Voith stroke control HS2 (data sheet: 911)
System of protection DIN 40050	IP65 with valve plug connected

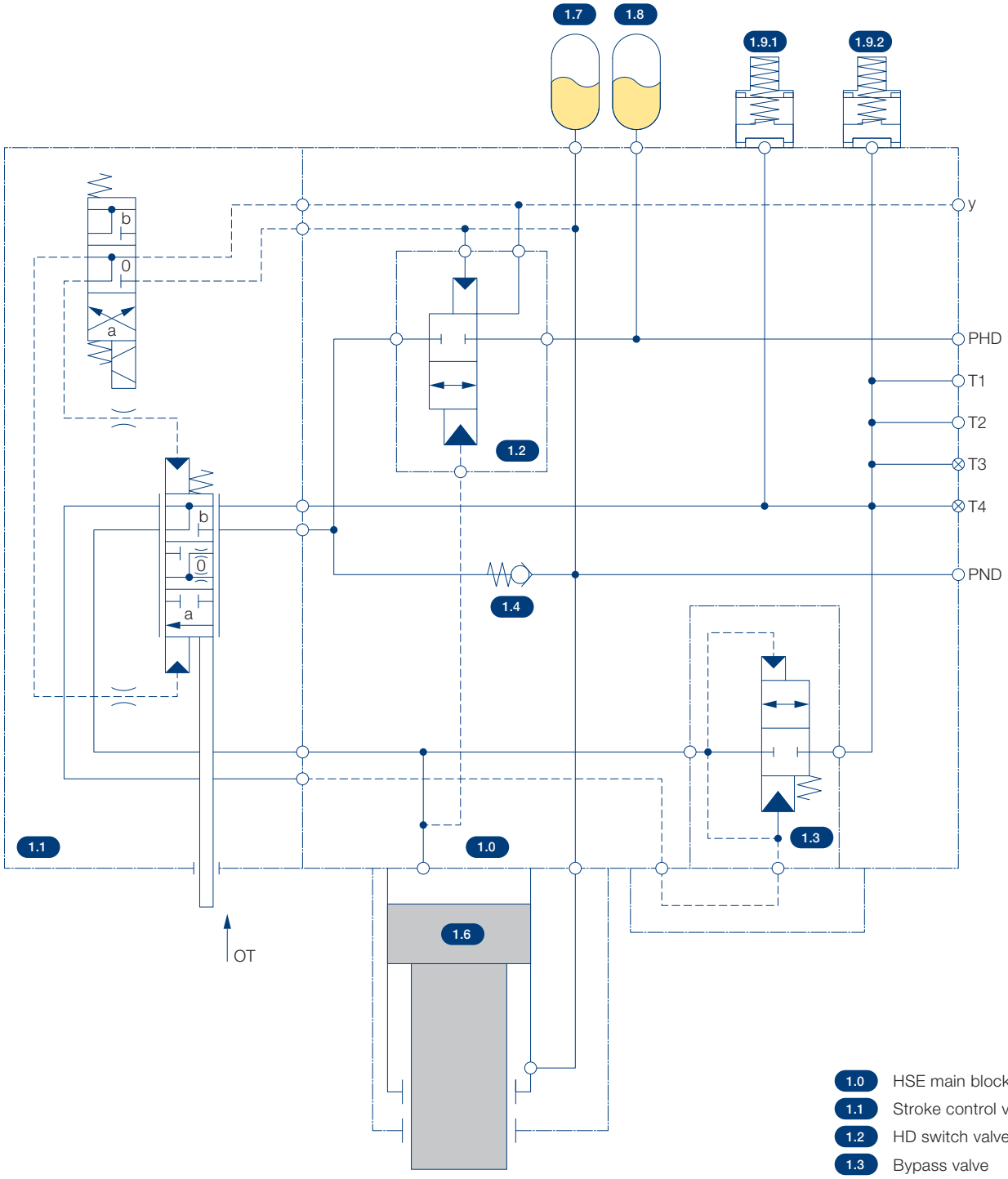
Further specific performance data according to computation minutes.

Hydraulic stroke control unit HSE NG 25 GT

Performance diagram

HSE Type	Punching force nominal [kN]	Punching force partial load operations [kN]	Return force [kN]	Cylinder		Punching cycle time at 25 mm stroke [ms]
				Ø Piston [mm]	Ø Rod [mm]	
HSE 65	650	92	119	200	145	200
HSE 80	800	112	143	220	160	230
HSE 100	1 000	141	189	250	180	250
HSE 120	1 200	178	207	270	200	290
HSE 140	1 400	193	251	290	210	320
HSE 170	1 700	229	311	320	230	390
HSE 200	2 000	285	361	350	255	470

Hydraulic circuit

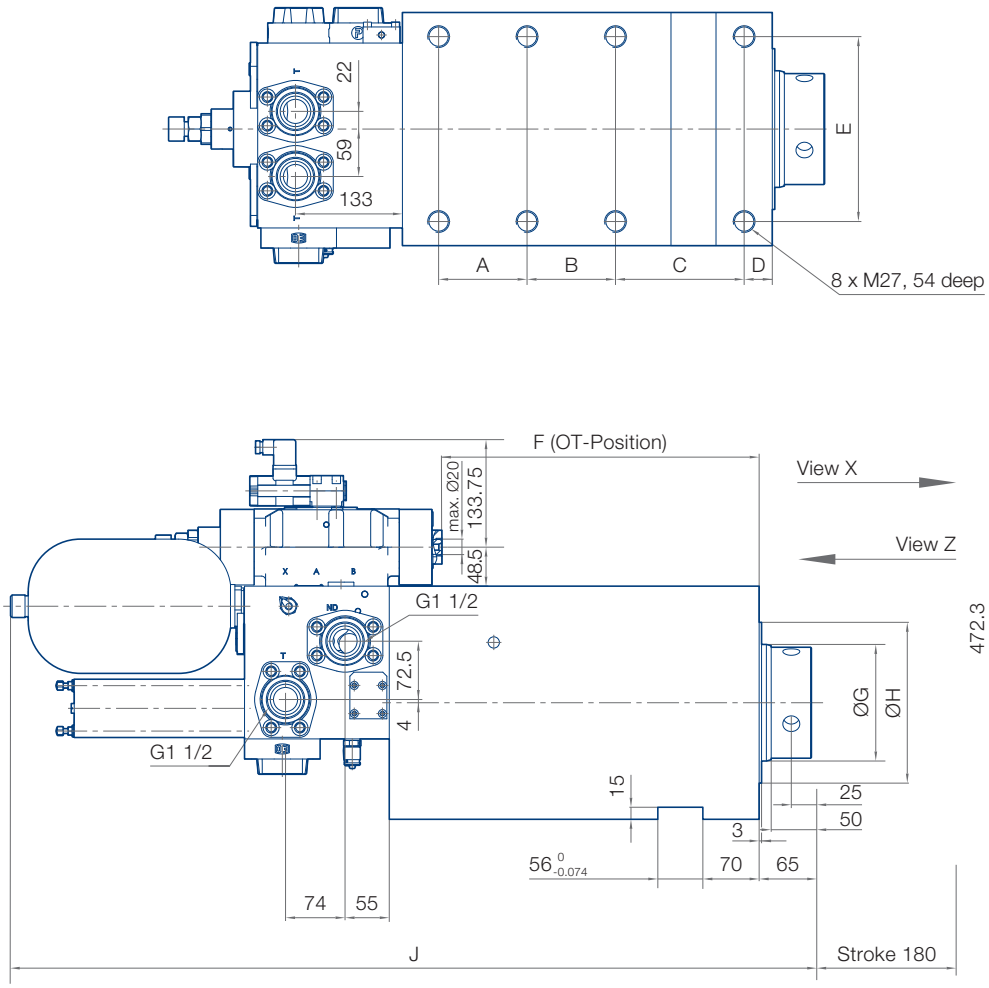


1.0 HSE main block
1.1 Stroke control valve
1.2 HD switch valve
1.3 Bypass valve
1.4 Check valve
1.6 Block cylinder
1.7 1.8 Accumulator
1.9.1 1.9.2 Tank damper

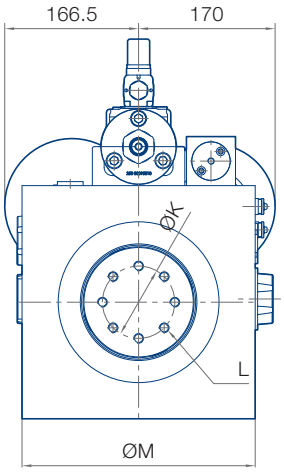
Basic dimensional drawing

Force [kN]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]	K [mm]	L [mm]	M [mm]
65	415	305	195	35	230	394,8	145	200 f7	996	90	M12	290
80	430	290	150	35	260	434,8	160	220 f7	1 036	110	M16	320
100	480	320	160	40	290	494,8	180	250 f7	1 096	130	M16	370
120	518	362	206	50	310	534,8	200	270 f7	1 136	130	M16	390
140	545	375	205	55	350	564,8	210	290 f7	1 166	150	M20	430
170	551	381	211	55	360	594,8	230	320 f7	1 196	160	M20	460
200	605	405	205	55	390	634,8	255	350 f7	1 236	180	M20	510

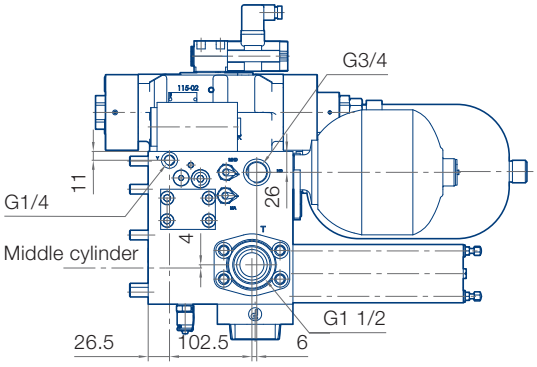
Further cylinder dimensions on request; all dimensions in mm; tolerance indication according to dimensioned drawing



View Z

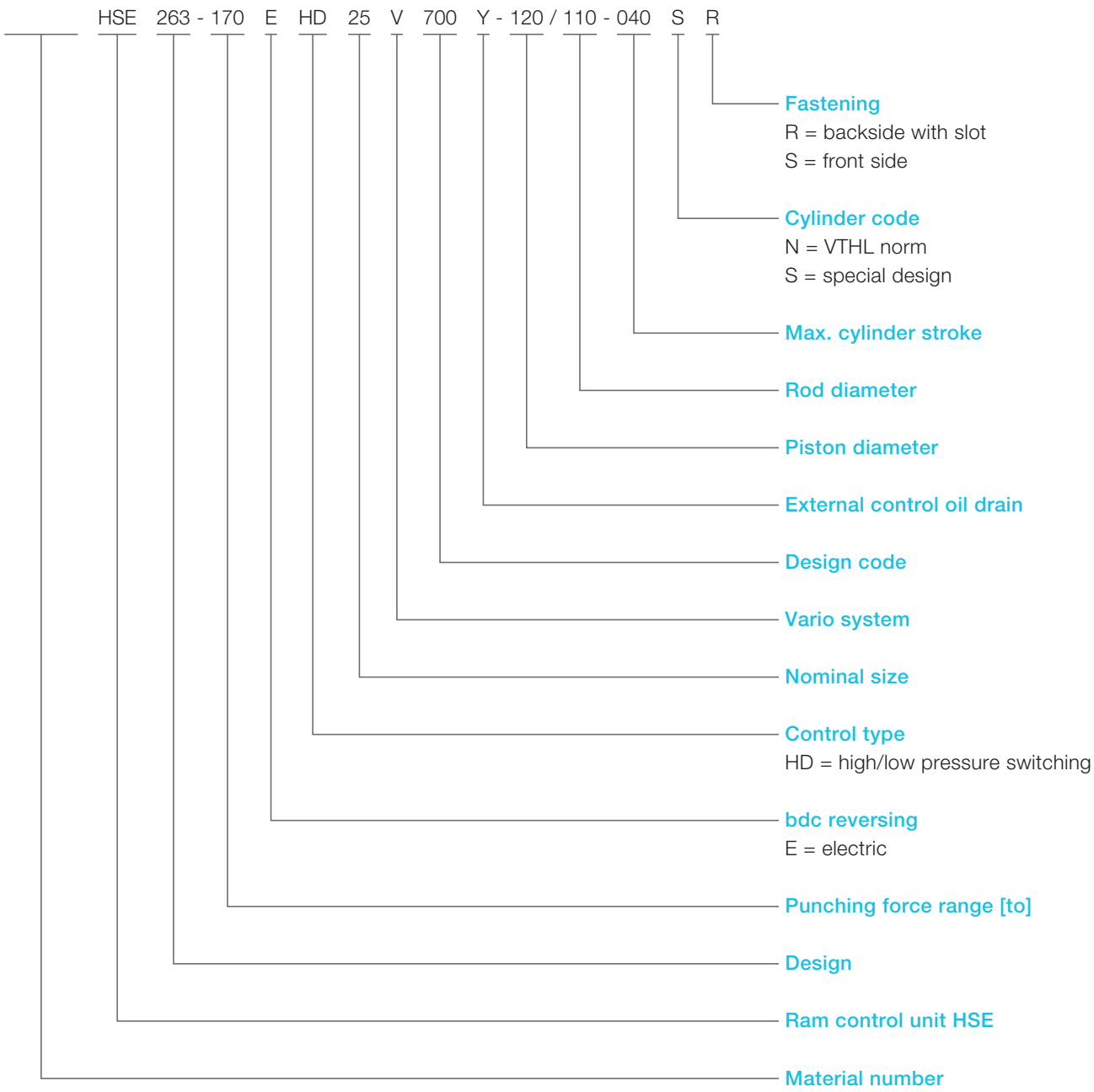


View Z (without cylinder)



All dimensions in mm

Type code



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Voith Group
St. Poeltener Str. 43
89522 Heidenheim
Germany

www.voith.com/hydraulics

Contact:
Phone +49 7152 992 3
sales-rut@voith.com