

Data sheet**Wire drawing machine 180 - 15
with standard spooler S 100 - 160 / Trav
and pay-off stand DAS 1,0/2****Specialized for precious metals****1. General**

Scope of supply

1 off wire drawing machine 180-15 with standard spooler S 100-160/Trav and pay-off stand DAS 1,0/2

Brief technical description

**Drawing machine 180-15:**

Two-cone pair single-chamber single-wire drawing machine with integrated capstan ; variable capstan speed for flexible adjustment of the elongation of the final die ; drawing cones and drawing dies are sprayed/netted with drawing agent; drawing cone pairs arranged vertically; with drawing-agent supply system consisting of a drawing-agent tank (approx.80 l content) and a drawing-agent spraying pump (pressure-regulated via frequency converter); with filter cartridges; with heat exchanger and thermostatic valves; with temperature control

Standard spooler S 100 - 160 / Trav:

dancer-controlled single-wire standard spooler (spooler with over-mounted and horizontally arranged spool shaft); spool traverse unit (traversing spool) with automatic traversing width control (without light barriers)

Wire pay-off stand DAS 1,0/2:

with wire accumulation system ; with wire-break and wire loop monitoring device

Note: Without fencing of the wire pay-off area ; to be provided by the customer, if required.

Layout

according to drawing ZA-ZU-088.0901-03

2. Production parameters

Wire material

Pd, Pt and Pt-alloys

max. wire inlet diameter

1.0 mm

max. wire inlet strength

1,200 MPa

min. finished wire diameter

0.2 mm at tensile 1,450 MPa

max. finished wire diameter

0.8 mm at tensile 900 MPa

Drawing speed

max. 6 m/s

Regulating range

1:10

min. production speed

1 m/s

Die schedules and production speed**I. Dia. 1.00 mm (max. 1,050 MPa) -> 0.2 mm (max. 1,450 MPa) with max. 5 m/s**

No.	CR %	Total CR %	WE %	Total WE %	phi	Wire-Ø mm
0	-	-	-	-	-	1,0000
1	16,32	0,16	19,50	19,50	0,18	0,9148
2	16,32	0,30	19,50	42,80	0,36	0,8368
3	16,32	0,41	19,50	70,65	0,53	0,7655
4	16,32	0,51	19,50	103,93	0,71	0,7003
5	16,32	0,59	19,50	143,69	0,89	0,6406
6	16,32	0,66	19,50	191,21	1,07	0,5860
7	16,32	0,71	19,50	248,00	1,25	0,5361
8	16,32	0,76	19,50	315,86	1,43	0,4904
9	16,32	0,80	19,50	396,95	1,60	0,4486
10	16,32	0,83	19,50	493,85	1,78	0,4104
11	16,32	0,86	19,50	609,65	1,96	0,3754
12	16,32	0,88	19,50	748,04	2,14	0,3434
13	16,32	0,90	19,50	913,40	2,32	0,3141
14	16,32	0,92	19,50	1111,02	2,49	0,2874
15	16,32	0,93	19,50	1347,17	2,67	0,2629
16	16,32	0,94	19,50	1629,36	2,85	0,2405
17	16,32	0,95	19,50	1966,59	3,03	0,2200
18	16,32	0,96	19,50	2369,58	3,21	0,2012

II. Dia. 1.00 mm (max. 800 MPa) -> 0.8 mm (max. 900 MPa) with max. 1 m/s

No	CR %	Total CR %	WE %	Total WE %	phi	Wire-Ø mm
0	-	-	-	-	-	1,0000
1	15,90	0,16	18,90	18,90	0,17	0,9171
2	16,32	0,30	19,50	42,09	0,35	0,8389
3	9,09	0,36	10,00	56,29	0,45	0,7999

III. Dia. 1.00 mm (max. 800 MPa) -> 0.67 mm (max. 950 MPa) with max. 2 m/s

Zug	CR %	Total CR %	WE %	Total WE %	phi	Wire-Ø mm
0	-	-	-	-	-	1,0000
1	15,68	0,16	18,60	18,60	0,17	0,9182
2	16,32	0,29	19,50	41,73	0,35	0,8400
3	16,32	0,41	19,50	69,36	0,53	0,7684
4	16,32	0,51	19,50	102,39	0,71	0,7029
5	9,09	0,55	10,00	122,63	0,80	0,6702

3. Technical description of the drawing machine 180-15

CRS; WE	<p>a) Machine gradations (correspond to the theoretical wire elongation or cross-sectional reduction without slippage); indications: 1st / 2nd cone pair / final die</p> <p>WE without s : 18 / 18 / 10 - 18 % CRS without s : 15.3 / 15.3 / 9.1 % - 15.3 %</p> <p>b) <u>Drawing-die gradations</u> (correspond to a possible wire elongation or cross-sectional reduction with slippage); indications: 1st / 2nd cone pair / final die</p> <p>WE with s : 19.5 / 19.5 / 11.5 - 18 % CSR with s : 16.3 / 16.3 / 10.3 % - 15.3 %</p> <p><u>Note:</u> The indicated drawing die gradations represent a possible value; the actually required or possible cross-sectional reduction has to be determined by the user considering the necessary slippage. Please note that too small slippage can result in wire breaks, too high slippage can result in high wear of drawing cones and drawing dies.</p>
Number of installed dies	<p>18, of these:</p> <ul style="list-style-type: none"> - pre-die with max. 19 % WE - 2 x 8 cone dies = 16 dies with 18 % WE without slippage and - 1 final die with 10 – 18 % WE without slippage ; Capstan with variable drive speed by own motor
Minimum number of dies	3
Drawing cones	ceramic – stainless steel compound structure
Ceramic material	zirconium oxide ceramics
Number of steps per cone	8
max. step-Ø	220 mm
min. step-Ø	69.0 mm
Steps	69.0 mm; 81.5 mm; 96.2 mm; 113.5 mm; 133.9 mm; 158.0 mm; 186,4 mm; 220.0 mm
Number of cone pairs	2
Arrangement of cone pairs	vertically; with S-deviation between cone pairs
Capstan / dry capstan	running surface-Ø 180 mm made of ceramic/steel compound structure (<u>without cooling</u>)
Ceramic material	zirconium oxide ceramics
Variable drive	final drawing shaft with own servo drive and frequency converter; to adjust the final die wire elongation between 10 % and 18 %
Spreader disk/separating pulley	Ø 120 mm made of ceramic / steel compound structure

Ceramic material	zirconium oxide ceramics
Wire inlet pulleys in front of drawing chamber	2 deflection pulleys Ø 100 mm made of aluminium with aluminium oxide ceramic coating ; located in ball bearings
Wire deflection pulley in drawing chamber	inlet roll in front of 1st drawing cone with 50 mm running surface-Ø made of hardened stainless steel with hard chrome plating
Wire deflection pulleys between cone pairs	2 deflection pulleys each Ø 48 mm made of steel with tungsten carbide coating
Wire straightener	not included
Drawing machine drive	Servo motor / asynchronous motor (make at our choice) with rating about 11 kW motor with constant torque in the range of 0... 7 m/s speed adjustment via frequency converter (make at our choice) and rated value presetting; rated value presetting and speed indication via operating panel (is located at the right-hand side or above the standard spooler) the frequency-converter drive corresponds to the requirements of the EC-EMC directive
Drawing shaft drive	via toothed belts
Shaft lubrication	grease lubrication
Sealing of drawing shafts against drawing agent	via rotary shaft seals (Viton) or axial face seals <u>Note:</u> Some drawing agents may shorten the service life considerably!
Drawing-agent supply system	consisting of drawing-agent tank and speed/pressure-controlled drawing-agent spraying pump; with filter cartridge; with drawing-agent cooling (drawing-agent/water/heat exchanger) regulated via cooling-water flow controller
Arrangement of drawing room	The drawing cones and drawing dies are sprayed/wetted with drawing agent during the drawing process.
Drawing agent storage tank	made of stainless steel
Installation	behind the drawing machine
Contents of drawing-agent tank	approx. 80 l
Level monitoring	level sensor make ifm type LK 7023
Drawing-agent spraying pump	centrifugal pump (make Iwaki); suitable for drawing agents with a max. viscosity of 22 cSt

Pressure control	using the speed control of the centrifugal pump via frequency converter
Pressure sensor	pressure transmitter make Huba Control
Quantity regulation of	by means of ball valves per cone pair and die holder
Drawing-agent heating	not included; will be provided by the customer
Drawing-agent cooling	plate heat exchanger of soldered design
Cooling water flow control of the plate heat exchanger	via cooling water flow controller (make at our choice)
Drawing-agent temperature monitoring	pipe sensor make GFR type F-ETF 521
Temperature indication	via operating panel
Drawing-agent cleaning	filter cartridge make MP-Filtri
Leakage collecting trough	not included; will be provided by the customer according to the actually valid legal regulations
Die holder	suitable for cylindrical drawing dies dia. 25 mm x 6...12 mm ; die holders with covers
Final die holder	of cardanic design, suitable for cylindrical drawing dies dia. 25 mm x 6 ... 12 mm
Cooling of final drawing die holder	not included
Wire steadying device	felt holder
Machine frame	welded structure made of mild steel ; drawing chamber, tank and pipes made of stainless steel; drawing chamber hoods made of stainless steel
Vibration insulation	via damping elements
Machine illumination	LED light in the spooler chamber
Accessories	not required

4. Technical description of the standard spooler S 100 - 160 / Trav

Spool range	plastic spools K 100 - K 125 acc. to IEC 60264-2-1 ; HK 76 (standard flange spool, <u>not</u> biconical)
Balancing grade	min. Q 6.3 as per VDI 2060 (applicable for metal spools only)
Spool tolerances	max. adm. variation in concentricity from bore and flange to core 0.1 mm <u>Note:</u> Only perfect and concentric spools must be used. Disposable spools must be used once only. The suitability of the spools for the above application has to be guaranteed by the customer.
Spool shaft	over-mounted
Spool fastening	by means of screw-on cone
Spool withdrawal	manually
Spooler drive	dancer-regulated servo (make at our choice), operated via frequency converter (make at our choice); with brake
Spool brake	s. spooler drive
Deceleration time	max. approx. 5 s in case of an emergency stop or wire break
Drive of spool shaft	direct drive
Spool shaft lubrication	grease lubrication
Spool traverse unit	traverse unit (traversing spool) with automatic tra- versing width control (<u>without</u> light barriers); variant A-2 The traverse unit is equipped with its own servo motor, which generates the linear movement in reversing operation via a ball roller spindle. The traverse unit can be used as a common traverse unit with manual setting of the change-over points or with automatic traversing width control.
Operating mode "common traverse unit"	The basic adjustment of the traversing width is done by selecting the spool type via the operating panel. Precision adjustment of the change-over points is effected via corrective values (+/- adjustment). <u>Note:</u> The optimum change-over time must be determined empirically by the customer by corrective input via the operating panel according to the operating parameters (wire speed, traversing speed, wire diameter, spool size etc.).

Operating mode "automatic traversing width control"	<p>The basic adjustment of the traversing width is done by selecting the spool type via the operating panel.</p> <p>The traversing width control is carried out with computer support according to a mathematical procedure evaluating various parameters.</p>
Operating principle of traverse unit	traversing spool
Traversing pattern	cylindrical winding of standard flange spools
Drive of wire traverse unit	<p>servo motor (make at our choice) and ball roller spindle</p> <p>controlled via servo frequency converter (make at our choice)</p> <p>traversing step/speed continuously adjustable</p>
Traversing step	<p>max. approx. $4 - 5 \times d_{\max}$</p> <p><u>Note:</u> 1 x d traversing is not possible</p> <p><u>Note:</u> The traversing step can be electronically coupled with the number of revolutions of the spool shaft. The traversing step is thus nearly constant from the spool core up to the spool flange; the coupling deviation is $\pm 10\%$.</p> <p>Operation with constant traversing speed is possible (traversing step increases with increasing filling ratio)</p>
Dancer	weight-actuated dancer compensator; adjustment of the dancer weight by hand
Rewind tensile force	<p>min. 2 N (200 g); max. 30 N (3000 g)</p> <p><u>Note:</u> exchangeable dancer arms for different ranges of rewind tensile force (A : 200 g to 1000 g ; B : 800 g to 3000 g)</p> <p><u>Note:</u> Values in accordance with customer specifications</p> <p><u>Note:</u> The optimum rewind tensile force has to be empirically determined by the customer. Damages resulting from a wrong rewind tensile force (e.g. damages on the spools) are at the sole risk of the customer</p>
Deflection pulleys	Ø 75 mm; ceramic compound structure
Traversing pulley	Ø 75 mm; ceramic compound structure
Measured values	actual speed value measurement and meter counter via sensor
Machine frame	welded structure made of mild steel

Machine illumination	in the working area of the standard spooler LED-light
Vibration insulation	via damping elements (all-metal dampers)
Accessories	not included

5. Technical description of the wire pay-off stand

Storage contents	min. approx. 1.0 m / max. approx 2 m <u>Note:</u> The storage contents is sufficient to decelerate the machine being fully equipped with drawing dies from maximum speed within approx. 15 s in case of stopping due to the formation of loops without a wire break in the wire inlet. Lower assignments or shorter ramp times may require larger storage contents.
Deflection pulleys	running surface-Ø 110 mm (4.33") made of polyamide PA6G; located in ball bearings; the deflection pulleys are cranked into each other (prevents the wire from running between the deflection pulleys)
Number of pulleys	top 2 + 2; bottom 1
Miscellaneous	- loop monitoring device - wire break and wire end detector
Machine frame	welded structure made of mild steel
Installation/fastening	by means of stone bolts or heavy-duty dowels at site on the workshop floor by the customer <u>Note:</u> The customer ensures the sufficient fastening of the wire pay-off stand. There is danger due to tilting!
Safety note	The wire inlet area must be sufficiently protected by the customer against access (e.g. fencing). The legal regulations (EC machine guidelines and applicable regulations for the prevention of accidents) are to be observed.

6. Process materials and media

Drawing agent	conventional drawing agent for Pt-wire that will be provided by the customer from the view of the machine manufacturer, the following requirements are to be defined to avoid injury to persons and damage to property: - max. viscosity 22 mm ² /s (cSt) - max. admissible drawing-agent temperature 50°C - sufficiently cleaned (= free from abrasions and wire residues which clog the drawing-agent circuit or damage the drawing-agent pump) <u>Note:</u> Some drawing emulsions can considerably reduce the lifetime of the shaft seals** (shorter maintenance intervals).
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Cooling water	<p>the cooling water supply will be effected by connection to the cooling-water circuit at site;</p> <p>from the view of the machine manufacturer the following requirements must be defined to avoid damage to persons, material and environment:</p> <ul style="list-style-type: none"> - connection to cooling water system at site (secondary circuit); the cooling-water return must not be guided directly into waters or the seepage; the water-protection regulations are to be observed - the cooling water must be free from rust or other particles - to avoid damage by frost, the cooling water must be provided with corrosive preventive - water hardness 4 ... 10 °dH - pH 6.7 ... 7.5 - max. adm. cooling-water run-on temperature 25°C - min. required run-on pressure 1.5 bar - max. admissible run-on pressure 3.0 bar - max. admissible return pressure 0.5 bar - cooling-water requirement max. ca. 1750 l/h Plate heat exchanger: max. ca. 1750 l/h, <p>to be installed by the customer at site:</p> <ul style="list-style-type: none"> - lockable main cock - monitoring pressure gauge with operating pressure indication
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Compressed-air	not required
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7. Description of the electric control

Electric equipment	As per EN 60204T 1 for ambient temperatures of min. 5°C and max. 40°C, the average temperature not exceeding 35°C for a period of 24 h; altitude up to 1000 m MSL; max. adm. air humidity 90 % related to 20° C and 50 % at 35° C. For other conditions, suitable additional measures will be required (extra price).
Protective mode of the electric control	IP 54
Mains voltage	3 x 415 V ; N ; PE
Mains frequency	50 Hz +/- 2%
Control voltage	24 V DC
Switch cabinet	
Installation	on the right side wall of the machine
Cooling	air circulation cooling using fan with filter mats
Control	via PLC make Siemens type S 7 - 1200
Data communication	Profinet
Remote maintenance	NetBiter

Electric components	make at our choice
PLC and TP	make Siemens
Frequency converter	make at our choice
Operating and control elements	<ul style="list-style-type: none">- main switch- control voltage On- emergency-stop device- connector for loop monitoring device and wire end detector on the wire pay-off stand (option)- wire end detector between final die and spool (detection via dancer position)- pedal key inching (three-position pedal key with emergency-stop function) <p>The remaining operating and control elements are integrated into an operating panel (TP700C).</p>
Wire diameter measuring unit	Zumbach ODAC14XY-J wire diameter measurement device
8. Miscellaneous	
Paint	machine RAL 6011 structural varnish (green) Switch cabinet RAL 7035 structural varnish (grey)
Documentation	3-fold in English language; manuals of components (e.g. frequency converter) 1-fold in English language
Operating menu	in English language
Machine labelling	in English language