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Special machine color:

# Saw Machining Centres

## ACS<sup>®</sup>102

## The Standard

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Ulrich Rattunde  
Ludwigslust, September 2<sup>nd</sup>, 2008





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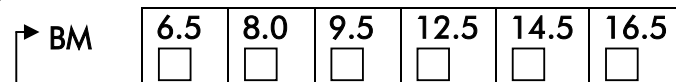
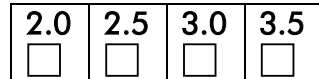
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## 1. ACS® syntax, basic models, basic combinations

### ACS® syntax

ACS®102



Material length  
**B**undle loading **M**agazine  
 Workpiece length  
 Machine size  
 Saw machining centre  
 (Automatic **C**ircuit **S**awing machine)

reference:

1.1/1.2/1.3/2.2/2.2.1/2.2.2/2.3.1

2.1

<input type="checkbox"/>	+BDM	Brush <b>D</b> eburring <b>M</b> achine	1.3/2.2/2.2.3/2.3.2/2.3.3
<input type="checkbox"/>	+CFM	Cham <b>F</b> ering <b>M</b> achine	1.3/2.2/2.2.4/2.3.1
<input type="checkbox"/>	+CFMcurve	Cham <b>F</b> ering <b>M</b> achine for <b>curve</b> -machining	1.3/2.2/2.2.4/2.3.1
<input type="checkbox"/>	+CFM+BDM	Chamfering with brush-deburring	1.3/2.2/2.2.5/2.3.1/2.3.2
<input type="checkbox"/>	+CFMcurve+BDM	Chamfering / curve-machining with brush-deburring	1.3/2.2/2.2.5/2.3.1/2.3.2
<input type="checkbox"/>	+SCB	<b>S</b> tep <b>C</b> onveyor <b>B</b> ridge	2.4
<input type="checkbox"/>	+WDM	<b>W</b> ashing and <b>D</b> rying <b>M</b> achine	2.5
<input type="checkbox"/>	+SRT	<b>S</b> tacking <b>R</b> obo <b>T</b>	2.7
<input type="checkbox"/>	+SRTH	<b>S</b> tacking <b>R</b> obo <b>T</b> / <b>H</b> igh	2.7
<input type="checkbox"/>	+SRTB	<b>S</b> tacking <b>R</b> obo <b>T</b> / <b>B</b> road	2.7
<input type="checkbox"/>	+SRTHB	<b>S</b> tacking <b>R</b> obo <b>T</b> / <b>H</b> igh <b>B</b> road	2.7
<input type="checkbox"/>	+ <b>CC/xx/x/x/EU</b> <b>CC/xx/x/x/CSA</b>	Driven roller conveyor for automatic <b>C</b> ontainer <b>C</b> hange, workpiece length/number of container positions/number of gearboxes/standard	2.8
<input type="checkbox"/>	+ <b>CCB/xx/x/x/EU</b> <b>CCB/xx/x/x/CSA</b>	Driven roller conveyor for automatic <b>C</b> ontainer <b>C</b> hange, <b>b</b> road, workpiece length/number of container positions/number of gearboxes/standard	2.8
<input type="checkbox"/>	+Pi	<b>P</b> eriphery, several further options	



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<input type="checkbox"/>	<b>+LM</b>	Length <b>M</b> asuring device	2.3.1/2.3.2
<input type="checkbox"/>	<b>+LMCFM</b>	Reducers for workpiece lengths >45 mm (mainly), 8 mm	
<input type="checkbox"/>	<b>+LMCFM</b>	Reducers for workpiece lengths >45 mm (mainly), 18 mm	
<input type="checkbox"/>	<b>+LMM</b>	Length <b>M</b> asuring device for <b>M</b> ultiple cut	2.3.3
<input type="checkbox"/>	<b>+DLC</b>	Optical detection of luminescent color markings (System for <b>D</b> etection of <b>L</b> uminescent <b>C</b> olor markings)	2.3.4
<input type="checkbox"/>	<b>+TI/1.6</b>	<b>T</b> able for visual <b>I</b> nspection before SRT stacking robot, length	2.6
<input type="checkbox"/>	<b>+mi</b>	<b>m</b> irror- <b>i</b> maged design	
<input type="checkbox"/>	<b>+MC</b>	Multiple cut equipment ( <b>M</b> ultiple- <b>C</b> ut) for material lengths up to 7 m, the material lengths must have the same length	
<input type="checkbox"/>	<b>+Pi</b>	BM lifting cylinders for separation of round material Ø 10 – 102 mm and profile 10x10 – 60x60 mm, pneumatic cylinder with PE-cover	
<input type="checkbox"/>	<b>+Pi</b>	BM lifting cylinders for separation of round material Ø 10 – 102 mm and profile 10x10 – 60x60 mm, pneumatic cylinder made of steel	
<input type="checkbox"/>	<b>+Pi</b>	BM lifting cylinders for separation of profile Ø 20 – 108 mm, (Ø 120 mm ACS® without BDM/CFM), profile 20x20 – 120x62 mm, with rings for separation, Ø 10 – 108 mm, profile 10x10 – 120x62 mm or round material (broad design), pneumatic cylinder with PE-cover	
<input type="checkbox"/>	<b>+Pi</b>	BM lifting cylinders for separation of profile Ø 20 – 108 mm, (Ø 120 mm ACS® without BDM/CFM), profile 20x20 – 120x62 mm, with rings for separation, Ø 10 – 108 mm, profile 10x10 – 120x62 mm or round material (broad design), pneumatic cylinder made of steel	
<input type="checkbox"/>	<b>+Pi</b>	BM lifting cylinder for separation of heavy material, double number of pneumatic cylinders made of steel	
<input type="checkbox"/>	<b>+Pi</b>	BM twin drive for belts, for bundle weight 6,000 kg	
<input type="checkbox"/>	<b>+Pi</b>	BM bundle diameter 800 mm	
<input type="checkbox"/>	<b>+Pi</b>	BM bundle diameter 1,000 mm	
<input type="checkbox"/>	<b>+Pi</b>	BM bundle diameter 1,200 mm	
<input type="checkbox"/>	<b>+Pi</b>	BM steel roller drive, maximum weight of material: 400 kg/pc (recommended for rusty or scaly material)	
<input type="checkbox"/>	<b>+Pi</b>	BM plastic roller drive	
<input type="checkbox"/>	<b>+Pi</b>	BM hoisting lift for position-defined transfer of profiles in the bundle loading magazine, maximum bundle dimension 600x600 mm (without belts)	
<input type="checkbox"/>	<b>+Pi</b>	BM pneumatic stopper with steel piston on top of the bundle loading magazine	
<input type="checkbox"/>	<b>+Pi</b>	BM pneumatic stopper with PE-covers on top of the bundle loading magazine for damage-free material handling	
<input type="checkbox"/>	<b>+Pi</b>	BM hold-down cylinder for deformed material on the pre-centering device (holding force: 3,000 N)	



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- +Pi BM safety fence located behind bundle loading magazine, height 1.8 m (also post), width of fence element 2.0 m, wire size 40 x 40 x 3 mm, color: post RAL 1003, signal yellow; grid RAL 9005, black
- +Pi BM safety fence with gate located behind bundle loading magazine (height 1.8 m; width 0.8 m) and safety switch
- +Pi BM light curtain at the front side of the bundle loading magazine, beam spacing 30 mm, height 1.35 m, color RAL 1003, signal yellow, front of bundle loading magazine
- +Pi BM light curtain at the operator's side and the pre-centering device of the bundle loading magazine, beam spacing 30 mm, height 1.75 m, color RAL 1003, signal yellow
  
- +Pi ACS perforation detection, length correction to maintain perforation pattern, laser measuring system
- +Pi ACS stamping device for stamping letters located in the grip feeder area for printing types <=3 mm in height, and approx. 0.2 mm in depth. Minimum workpiece length = 250 mm if stamping is to be 40 mm from edge of the tube (The minimum workpiece length increases as the distance between the stamp and the edge of the tube is increases.
- +Pi ACS longitudinal printing of material with inkjet printer in grip feeder area
- +Pi ACS chip conveyor with rubber belt conveyor
- +Pi ACS magnetic chip conveyor
- +Pi ACS extension pole for chip blow before measuring
- +Pi ACS monitoring system for saw blade temperature
- +Pi ACS reverse loader with belts / chains for workpiece accumulation, for workpiece lengths from 200 mm onward
- +Pi ACS 83dBA sound deadening
- +Pi ACS water cooling for saw gearbox, for external cooling circuit
- +Pi ACS water cooling for saw gearbox, for closed circuit cooling
- +Pi ACS water cooling for saw gearbox and drive motor, for closed circuit cooling
- +Pi ACS software "Analyst" including computer, screen and printer, installed on the machine, additionally build in the sawing machine
- +Pi ACS software "Analyst", without installation, PC version
- +Pi ACS software "Performance calculator", with and without table fonction
- +Pi ACS LAN network connection, Ethernet
- +Pi ACS VPN connection, suitable for internet or separate DSL lines (instead of a modem)
- +Pi ACS exhaust for machine interior (electrostatic) to remove oil and emulsion mist suitable for recirculating air operation
- +Pi ACS autotransformer 150 kVA (Canada), 3 x 575 V / 3 x 400 V, as required electrically isolated or not
- +Pi ACS transformer, electrically insolated
- +Pi ACS magnetic chip conveyor Z,



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		feeding of scrap containers up to a height of 1.2 m, height of the outlet 1.4 m, workpiece length up to 2,000 mm	
<input type="checkbox"/>	+Pi	ACS switch cabinet heating	
<input type="checkbox"/>	+Pi	BDM pneumatic cleaning before measuring (before BDM), blowing out and exhausting	
<input type="checkbox"/>	+Pi	BDM interior cleaning of tubes by means of a pneumatic cylinder with brush, one stroke for each workpiece length (after BDM)	
<input type="checkbox"/>	+Pi	BDM dust collector with water separator for extraction of brush-deburring dust with exhaust muffler < 75 dB (A), motor 50 Hz	
<input type="checkbox"/>	+Pi	CFM chip conveyor with rubber belt conveyor for chamfering machine CFM 2.0; 2.5; 3.0; 3.5	
<input type="checkbox"/>	+Pi	CFM magnetic chip conveyor for chamfering machine CFM 2.0; 2.5; 3.0; 3.5	
<input type="checkbox"/>	+Pi	CFM pneumatic cleaning (after CFM), blowing out and exhausting	
<input type="checkbox"/>	+Pi	CFM interior cleaning of tubes by means of a pneumatic cylinder with brush, one stroke for each workpiece length (after CFM)	
<input type="checkbox"/>	+Pi	CFM inside arbor test by means of a pneumatic cylinder, one stroke per workpiece length and diameter (after CFM), accessory device inside the machine for one defined workpiece diameter, workpiece length 100 - 500 mm, inside diameter 15 mm minimum	
<input type="checkbox"/>	+Pi	CFM protection covers for end machining heads HSK-C 80 depending on size of end machining head, can be replaced with end machining heads	
<input type="checkbox"/>	+Pi	SCB measuring of circular runout, laser measuring system	2.4/2.4.1
<input type="checkbox"/>	+Pi	SCB measuring of perpendicularity, laser measuring system	2.4/2.4.2
<input type="checkbox"/>	+Pi	SCB "Penguin 1" (patent by RATTUNDE)	2.4/2.4.3
<input type="checkbox"/>	+Pi	SCB "Penguin 2"	2.4/2.4.4
<input type="checkbox"/>	+Pi	SCB scale for workpieces 12 kg	2.4/2.4.5
<input type="checkbox"/>	+Pi	SCB scale for workpieces 24 kg	2.4/2.4.6
<input type="checkbox"/>	+Pi	SCB "Flyer" (patent by RATTUNDE)	2.4/2.4.7
<input type="checkbox"/>	+Pi	SCB chip blow	2.4/2.4.8
<input type="checkbox"/>	+Pi	SCB interior cleaning of tubes by means of a pneumatic cylinder, with one stroke (before drives of the workpiece )	2.4/2.4.9
<input type="checkbox"/>	+Pi	SCB inside arbor test	2.4/2.4.10
<input type="checkbox"/>	+Pi	SCB station for roller-burnishing	2.4/2.4.11
<input type="checkbox"/>	+Pi	SCB accumulation table for rejected workpieces, outward transfer executed with great care, dimensions in m: B (depending on workpiece length= xx x L=1.6 m x H = 1.05 m	
<input type="checkbox"/>	+Pi	SCB accumulation table with scrap sorting	
<input type="checkbox"/>	+Pi	SCB frontside labeling of workpieces with inkjet printer (without any damage), only solid material	



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- |                          |            |                                                                                                                                          |         |
|--------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <input type="checkbox"/> | <b>+Pi</b> | WDM oil skimmer for washing emulsion<br>(only active when machine is idle)                                                               |         |
| <input type="checkbox"/> | <b>+Pi</b> | WDM continuous adjustment of exhaust fan via operating parameters<br>(necessary for acoustic protection 83dBA)                           |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT magnetic gripper with vacuum gripper for wooden strips                                                                               |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT automatic change of grippers, magnetic gripper $\leftrightarrow$ vacuum gripper<br>with deposit station for the unutilized gripper   |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT pneumatic vacuum gripper for one defined diameter each,<br>consisting of base plate with suckers vacuum gripper                      |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT pneumatic vacuum gripper with adapter for quick changeover<br>for one defined diameter each                                          |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT magnetic gripper with adapter for quick changeover                                                                                   |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT magnetic gripper, special design turned by 90°, poles turned by 90°<br>for long solid material and workpiece weights, mainly > 25 kg |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT magnetic twin gripper for long, solid material                                                                                       |         |
| <input type="checkbox"/> | <b>+Pi</b> | SRT sampling from safety area,<br>workpiece length up to 2,000 mm, 2,500 mm, 3,000 mm or 3,500 mm                                        | 2.7/2.8 |
| <input type="checkbox"/> | <b>+Pi</b> | Screw compressor with refrigerant type dryer, 6,3 m <sup>3</sup> /min, 7 - 8 bar,<br>incl. compressed air reservoir 2 m <sup>3</sup>     |         |
| <input type="checkbox"/> | <b>+Pi</b> | Operators platform made of steel                                                                                                         |         |
| <input type="checkbox"/> | <b>+Pi</b> | Special machine color only colors according to RAL specification available,<br>delivery time will be extended by eight weeks             |         |
| <input type="checkbox"/> | <b>+Pi</b> | Acoustic alarm                                                                                                                           |         |



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## 1.1 7 ACS® Basic models

ACS®102...	Sawing
ACS®102...+LM	Sawing+Length measuring
ACS®102...+BDM	Sawing+Brush-deburring
ACS®102...+CFM	Sawing+Chamfering
ACS®102...+CFMcurve	Sawing+Chamfering / curve-machining
ACS®102...+CFM+BDM	Sawing+Chamfering+Brush-deburring
ACS®102...+CFMcurve+BDM	Sawing+Chamfering / curve-machining +Brush-deburring

## 1.2 49 Basic combinations

Basic model	possible combinations
ACS®102...	→ Container
ACS®102...+LM	→ Container
ACS®102...+BDM	→ +SCB → Container
ACS®102...+CFM	→   → +SCB+WDM → Container
ACS®102...+CFMcurve	→ +SCB+WDM(+TI)*+SRT(+CC)* → Container
ACS®102...+CFM+BDM	→ +SCB (+TI)* +SRT (+CC)*
ACS®102...+CFMcurve+BDM	→ +WDM → Container     → +WDM (+TI)* +SRT (+CC)* → Container     → (+TI)* +SRT (+CC)* → Container

\*(...) optional

### Restrictions for basic combinations

ACS®102...+CFM	requires +LM
+Pi Brush cleaning device after BDM	only for ACS®102...+BDM → Container

### Color

Color of ACS saw machining centres in RAL 5000 and RAL 5012 (RATTUNDE standard blue)

## 1.3 Basic functions for all ACS® basic models

- central parametric operator interface
- processing of solid material is possible within the weight limits
- simultaneous production of 3 different workpiece lengths is possible. Discharge of 2<sup>nd</sup> and 3<sup>rd</sup> workpiece lengths can be directed to the rear of the machine or through the chip conveyor
- data management of all workpiece related parameters, approx. 10,000 different workpieces
- storage of each individual workpiece processed, measured values etc., approx. 50,000,000 pieces
- material lead edge detection (light sensor)
- detection of the end of the material (light sensor), scrap end length sensor
- automatic adjustment of workpiece length and temperature compensation with existing length measuring device
- saw blade / saw drive monitoring
  - minimum torque
  - maximum torque
  - operating limits of saw torque (preset parameters via operator panel)
  - operating limits workpiece counter (preset parameters via operator panel)
  - operating limits cutting area (preset parameters via operator panel)
  - operating limits saw blade temperature (optional) (preset parameters via operator panel)
  - tool break monitoring
  - crash monitoring with logging
  - quick return of saw blade (10ms) in case of crash, emergency stop or power failure
  - vibration monitoring, operating limits vibration
  - calculation and display of critical cutting speed for applicable saw blade
  - rejection of the 1st workpiece after incomplete saw cut, for example after emergency stop or crash
- monitoring of clamping device of the grip feeder, including position measuring system
  - monitoring of minimum clamping force (preset parameters via operator panel)
  - monitoring of maximum clamping force (preset parameters via operator panel)
  - continuous clamping force adjustment (preset parameters via operator panel)
  - rejection of workpiece upon machine fault
- monitoring of clamping device of the saw, including position measuring system
  - monitoring of minimum clamping force (preset parameters via operator panel)
  - monitoring of maximum clamping force (preset parameters via operator panel)
  - continuous clamping force adjustment (preset parameters via operator panel)



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## Basic functions for all ACS® basic models with BDM

- automatic length adjustment
- parametric presetting of engagement depth of roller brushes, modification during automatic mode possible
- NC transport disc system, parametric presetting of the transport angle of the compartment in the transport disc, 6 transport discs, secure workpieces while they are rotated 360° during brushing procedure, even with profile material
- transport function for round material, quad-cut, double cut, profile material
- transport function for austenitic stainless steels, multiple deburring including automatic, variable engagement depth of roller brushes during deburring procedure
- continuous adjustment of brush rotational settings
- power monitoring of brush drives
- chip blow before brush-deburring, selectable chip blow methods

## Basic functions for all ACS® basic models with CFM or CFMcurve

- monitoring of chamfering tools
- torque limit with quick return 10 ms
- operating limits of minimum torque (preset parameters via operator panel)
- operating limits of maximum torque (preset parameters via operator panel)
- operating limits workpiece counter (preset parameters via operator panel)
- operating limits cutting area (preset parameters via operator panel)
- tool break monitoring
- crash monitoring
- quick return traverse of saw blade (10 ms) in case of crash, emergency stop or power failure
- material center adjustment based on chamfering torque
- rejection of workpieces outside operating limits
- monitoring of clamping device for chamfering, including position measuring system (left/right)
- monitoring of minimum clamping force (preset parameters via operator panel)
- monitoring of maximum clamping force (preset parameters via operator panel)
- continuous clamping force adjustment (preset parameters via operator panel)
- chip blow before chamfering, blowing out with rotations
- chip blow after chamfering



## Basic functions for all ACS® basic models with CFMcurve

- each curve-head (chamfering head) includes 3 NC-controlled tool supports
- standardized tool holders (RATTUNDE Standard) for inside chamfer, outside chamfer, facing, inside groove, outside groove, inside contour, outside contour, inside drilling, facing including inside or outside deburring, inside thread, outside thread
- presetting of inside and outside chamfer length and groove position using operating parameters, no manual chamfering tool adjustment necessary.
- modification of inside and outside chamfer length possible during processing
- automatic adjustment of insert position for facing to guarantee optimum service life of facing insert, controllable using operating parameters
- parametric processing of inside and outside groove
- parametric processing of inside and outside chamfer by means of tool holders for inside and outside contouring for free chamfer angles, double chamfers, transition facing – chamfer with radius or facet, transition chamfer – chamfer with radius or facet for double chamfer, transition chamfer - outer surface of workpiece with radius or facet
- free NC-program interface available for further operations such as thread cutting, sphere machining, curve (relieved) milling etc.

## 2. Assembly groups, combinations, limit values

### 2.1 Bundle loading magazine (BM)

#### Limits for material lengths (master length) for ACS® basic models with bundle loading magazine

ACS®102/xx/BMyy	Sawing
ACS®102/xx/BMyy+LM	Sawing+Length measuring
ACS®102/xx/BMyy+BDM	Sawing+Brush-deburring
ACS®102/xx/BMyy+CFM	Sawing+Chamfering
ACS®102/xx/MByy+CFMcurve	Sawing+Chamfering / Curve-machining
ACS®102/xx/BMyy+CFM+BDM	Sawing+Chamfering+Brush-deburring
ACS®102/xx/BMyy+CFMcurve+BDM	Sawing+Chamfering / Curve-machining + Brush-deburring
BM6.5	material lengths 3,000 – 6,500 mm
BM8	material lengths 3,000 – 8,000 mm
BM9.5	material lengths 3,000 – 9,500 mm
BM12.5	material lengths 3,000 – 12,500 mm
BM14.5	material lengths 3,000 – 14,500 mm
BM16.5	material lengths 3,000 – 16,500 mm

#### Limitations of maximum material lengths for small dimensions:

- for Ø 10 mm, profile 10x10 mm <= 6,500 mm
- for Ø 12 mm, profile 12x12 mm <= 7,500 mm
- for Ø 14 mm, profile 14x14 mm <= 9,000 mm
- for Ø 16 mm, profile 16x16 mm <= 12,000 mm

#### Limitations of material length tolerances:

- maximum length difference within one bundle: 33%
- maximum length difference within one bundle in case of multiple cut: 10 mm
- acceptable deviation from straightness of material: 1.5 mm/m (DIN)

#### Limitations on master lengths for BM bundle loading magazine, material lengths:

- trim-cut length: 0 or 5 mm to 500 mm to be added when calculating master lengths.
- scrap end length: 70 mm to maximum workpiece length of machine +70 mm to be added when calculating master lengths.
- maximum weight of material, oily: 260kg/pc < 10 m      400kg/pc > 10 m
- maximum weight of material, dry, rusty, scaly: 260 kg/pc
- maximum weight of bundle: 5,000 kg



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Safety fence at the narrow side of the bundle loading magazine (6 m) is included in the price.  
Color: post RAL 1003, signal yellow; grid RAL 9005, black

## 2.2 ACS<sup>®</sup> basic models, limit values for dimensions, workpiece lengths and weight

ACS <sup>®</sup> 102/xx/BMyy	Sawing
ACS <sup>®</sup> 102/xx/BMyy+LM	Sawing+Length measuring
ACS <sup>®</sup> 102/xx/BMyy+BDM	Sawing+Brush-deburring,
ACS <sup>®</sup> 102/xx/BMyy+CFM	Sawing+Chamfering,
ACS <sup>®</sup> 102/xx/BMyy+CFMcurve	Sawing+Chamfering / Curve-machining,
ACS <sup>®</sup> 102/xx/BMyy+CFM+BDM	Sawing+Chamfering+Brush-deburring,
ACS <sup>®</sup> 102/xx/BMyy+CFMcurve+BDM	Sawing+Chamfering / Curve-machining +Brush-deburring

xx = 2	maximum workpiece length 2,000 mm / maximum weight 25 kg/pc
xx = 2.5	maximum workpiece length 2,500 mm / maximum weight 25 kg/pc
xx = 3	maximum workpiece length 3,000 mm / maximum weight 25 kg/pc
xx = 3.5	maximum workpiece length 3,500 mm / maximum weight 25 kg/pc

### Limitations of the maximum workpiece lengths

ACS <sup>®</sup> 102/xx/BMyy+CFMcurve	Sawing+Chamfering / Curve-machining (with curve-heads)
ACS <sup>®</sup> 102/xx/BMyy+CFMcurve+BDM	Sawing+Chamfering / Curve-machining (with curve-heads)+Brush-deburring

xx = 2	maximum workpiece lengths 1,900 mm / maximum weight 25 kg/pc
xx = 2.5	maximum workpiece lengths 2,460 mm / maximum weight 25 kg/pc
xx = 3	maximum workpiece lengths 3,000 mm / maximum weight 25 kg/pc
xx = 3.5	maximum workpiece lengths 3,400 mm / maximum weight 25 kg/pc

### minimum workpiece lengths for basic models

- all basic models ACS<sup>®</sup> without discharge handling system ACS,  
transport by chip conveyor,  $\geq 3$  mm
- all basic models ACS<sup>®</sup> with discharge handling system ACS,  
transport to outlet at the back  $\geq 7$  mm
- all basic models ACS<sup>®</sup> with discharge handling system ACS,  
transport to outlet at the front side,  $\geq 7$  mm or according to the following limitations

## 2.2.1 ACS®102... *Sawing*

### Single cut

with a tool clamping range of 10 mm  
from Ø 10 mm to Ø 120 mm, profile 10x10 – 100x100 mm, 120x62 mm

### Double cut

with a tool clamping range of 5 mm  
from Ø 10 mm to Ø 51.5 mm

### Triple cut

with a tool clamping range of 5 mm  
from Ø 14 mm to Ø 31.5 mm

### Quadruple cut

with a tool clamping range of 2 mm  
from Ø 10 to Ø 14 mm

possible combinations for ACS®102:

ACS®102... → Container

Please note: no further combinations are possible with this basic model.

## 2.2.2 ACS®102...+LM *Sawing with length measuring (single length measuring)*

### Single cut

with a tool clamping range of 10 mm  
from Ø 10 mm to Ø 105 mm, profile 10x10 – 74x74 mm, 100x40 mm  
for workpiece lengths > 50 mm

Profile 74x74 - 80x80 mm, 100x60 mm possible,  
for workpiece lengths > 50 mm  
cannot be rejected during length measuring,  
machine will stop automatically in case of faulty length.

### Double cut only single length measuring

with a tool clamping range of 5 mm  
from Ø 10 mm to Ø 31.5 mm for workpiece lengths from 100 mm to 2,000 mm



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from Ø 31.5 mm to Ø 45 mm for workpiece lengths from 250 mm to 2,000 mm

Triple cut only single length measuring

with a tool clamping range of 5 mm

from Ø 14 mm to Ø 31.5 mm for workpiece lengths from 100 mm to 2,000 mm

Quadruple cut only single length measuring

with a tool clamping range of 2 mm

from Ø 10 mm top Ø 14 mm for workpiece lengths from 100 mm to 1,250 mm

workpiece lengths > 1,250 mm only with reduced performance

Mechanics, pneumatics, sensors, electrics, software

Special tools required!

possible combinations for ACS® 102...+LM with length measuring:

→ Container

→ +SCB → Container

→ +TI +SRT → Container

→ +Pi ACS reverse loader with belts / chains, for workpiece accumulation

## 2.2.3 ACS® 102...+BDM

### *Sawing+Brush-deburring*

ACS® 102...+BDM +LM with length measuring

ACS® 102...+BDM +LMM with length measuring device for multiple cut

Single cut

with a tool clamping range of 10 mm

from Ø 10 mm to Ø 108 mm, profile 10x10 – 80x80 mm, 120x62 mm

for workpiece lengths > 100 mm

Double cut

with a tool clamping range of 5 mm

from Ø 10 mm to Ø 31.5 mm

for work piece lengths from 100 mm to 2,000 mm

from Ø 31.5 mm to Ø 45 mm

for workpiece lengths from 250 mm to 2,000 mm

Triple cut

with a tool clamping range of 5 mm

from Ø 14 mm to Ø 31.5 mm

for workpiece lengths from 100 mm to 2,000 mm





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Quadruple cut  
with a tool clamping range of 2 mm  
from Ø 10 to Ø 14 mm  
for workpiece lengths from 100 mm to 1,250 mm  
workpiece lengths > 1,250 mm only with reduced performance

Mechanics, pneumatics, sensors, electrics, software  
Special tools required!

Brush shaft Ø 120 mm, brush dimensions Ø 300 mm x length 600 mm  
(limit of brush wear with +LMM Ø 260 mm, with +LM Ø 250 mm)

possible combinations for  
ACS®102...+BDM           Sawing+Brush-deburring  
ACS®102...+BDM+LM    with length measuring  
ACS®102...+BDM+LMM with length measuring device for multiple cut

- Container
- +Pi ACS reverse loader with belts / chains, for workpiece accumulation
- +SCB → Container
- +SCB+WDM → Container
- +SCB +WDM (+TI)\* +SRT (+CC)\* → Container
- +WDM → Container
- +WDM (+TI)\* +SRT (+CC)\* → Container
- (+TI)\* +SRT (+CC)\* → Container

\*(...) optional

## 2.2.4       ACS®102...+CFM+LM

*Sawing+Chamfering+Length  
measuring*

ACS®102...+CFMcurve+LM

Sawing+Chamfering / Curve-machining  
+length measuring

Single cut  
with a tool clamping range of 5 mm  
from Ø 10 mm to Ø 105 mm  
for workpiece lengths > 7 mm

Single cut, but only without chamfering  
profile 10x10 – 74x74 mm, 100x40 mm  
for workpiece lengths > 50 mm

Profile 74x74 - 80x80 mm, 100x60 mm can be cut and measured,  
for workpiece lengths > 50 mm



for workpiece lengths > 100 mm.  
cannot be rejected during length measuring,  
machine will stop automatically in case of faulty length.

double cut only without chamfering  
for a tool clamping range of 5 mm  
from Ø 10 mm to Ø 31.5 mm  
for workpiece lengths > 100 mm

Brush-deburring machine with separate machine bed.

possible combinations for  
ACS® 102... + CFM + BDM,  
ACS® 102... + CFMcurve + BDM

- Container
- +SCB → Container
- +SCB+WDM → Container
- +SCB +WDM (+TI)\* +SRT (+CC)\* → Container
- +WDM → Container
- +WDM (+TI)\* +SRT (+CC)\* → Container
- (+TI)\* +SRT (+CC)\* → Container

\*(...) optional

## 2.3 Measuring systems for basic models

### 2.3.1 LM length measuring on ACS® 102..., ACS® 102... + CFM...

- Ø 10 mm to Ø 92 mm measuring at diameter (2 measuring points per end) by means of two parallel measuring jaws ("vernier calliper")
- Ø 92 mm to Ø 105 mm measuring lower wall at diameter (1 measuring point per end) by means of two parallel measuring jaws ("vernier calliper")
- gauge of measuring jaw 10 mm
- measuring standard, Heidenhain - absolute
- measuring capability, standard deviation  $S_g \leq 0.001 \text{ mm}$
  
- Calibration standard Ø 30x150 mm will be supplied
  
- with sorting function



## 2.3.2 LM length measuring on ACS<sup>®</sup> 102...+BDM...

- Ø 10 mm to Ø 35 mm mechanical measuring at diameter (2 measuring points per end) by means of two parallel measuring jaws ("vernier calliper")
- Ø 35 mm to Ø 108 mm mechanical measuring lower wall at diameter (1 measuring point per end) by means of two parallel measuring jaws ("vernier calliper")
- gauge of measuring jaw 6 mm
- measuring standard, Heidenhain - incremental
- measuring capability, standard deviation  $S_g \leq 0.0075 \text{ mm}$
  
- Calibration standard Ø 30x150 mm will be supplied
  
- with sorting function

## 2.3.3 LMM length measuring device for multiple cut on ACS<sup>®</sup> 102...+BDM.. (patent by RATTUNDE)

- only applicable on basic model ACS<sup>®</sup> 102...+BDM
  
- quadruple measuring
- Ø 10 mm to Ø 14 mm measuring at 1 measuring point per end per workpiece by means of two parallel measuring jaws
- maximum length difference in case of quad-cut 0.25 mm
- measuring accuracy, standard deviation  $S_g \leq 0.0075 \text{ mm}$
  
- double measuring
- Ø 12 mm to Ø 45 mm measuring at 1 measuring point per end per workpiece by means of two parallel measuring jaws
- maximum length difference of the 2 workpieces 0.25 mm
- measuring accuracy, standard deviation  $S_g \leq 0.0075 \text{ mm}$
  
- single measuring
- Ø 10 mm to Ø 80 mm measuring by diameter (2 measuring points per end) by means of two parallel measuring jaws
- Ø 80 mm to Ø 105 mm measuring lower wall at diameter (1 measuring point per end) by means of two parallel measuring jaws
- gauge of measuring jaw 6 mm
- measuring standard, Heidenhain - incremental
- measuring accuracy, standard deviation  $S_g \leq 0.0075 \text{ mm}$
  
- Calibration standard Ø 30x150 mm will be supplied



- 4 x calibration standard Ø 12x200 mm will be supplied
- with sorting function

## *2.3.4 DLC Optical detection of luminescent color markings*

- +DLC available for all basic models
- for sorting of color-marked workpieces marked with luminescent color all around
- Ø 10 mm to Ø 105 mm
- for single cut only
- 4 sensors for luminescent color detection
- detection optionally with 1 or 2 sensors
- scan angle at outside circumference of the material 90°
- luminescent color markings to be applied on material lengths by customer
- minimum marking length 200 mm
- minimum marking length 20 mm on 90° or at the circumference
- monitoring function of sensors
- parametric safety distance
- rejection of workpieces to the rear of the machine
- counter for rejected workpieces

## *2.4 SCB Step conveyor bridge*

- maximum workpiece length of the machine (2 m, 2.5 m, 3 m, 3.5 m)

Base for additional measuring devices and process steps

The measuring points can be arranged individually for measuring tasks, for example measuring of perpendicularity, circular runout, ovality etc. (1 measuring point corresponds approximately to one laser displacement sensor)

Incl. drives for workpiece rotation  
with conveyor for outward transfer of rejects

Conditions of the following measuring methods on SCB, **without** clamping device:

- all measuring methods can only be activated for single-cut
- for multiple-cut only transfer is possible, for workpiece lengths > 50 mm
- profile 10x10 - 60x60 mm, for workpiece lengths > 25 mm,  
laser measuring systems **cannot** be activated, scale for workpieces can be activated





- Ø 10 to Ø 105 mm, for workpiece lengths > 25 mm, transfer only  
all laser measuring systems **cannot** be activated, scale for workpieces can be activated
- Ø 10 to Ø 105 mm, for workpiece lengths > 50 mm,  
all measuring systems can be activated

Conditions for the following functions on SCB, **with** clamping device:

- all functions can only be activated for single-cut
- for multiple-cut only transfer possible, for workpiece lengths > 80 mm
- profile 10x10 - 60x60 mm, for workpiece lengths > 80 mm,  
only chip blow can be activated
- Ø 10 mm to Ø 105 mm, for workpiece lengths > 80 mm, all functions can be activated
- Please note: Maximum 2 clamping stations available, there are limited functions
- Chip blow on SCB or brushing device on SCB are interchangeable, and one clamping device is necessary

## Unavailable function combinations of functions on SCB:

- "Penguin1" **and** "Penguin2" is not possible
- "Penguin1" **and** perpendicularity measuring is not possible
- scale **and** 2 clamping devices are not possible
- more than 2 clamping devices are not possible

## available combinations for SCB

- BDM → SCB
- CFM → SCB
- SCB → Container
- SCB → WDM
- SCB → TI
- SCB → SRT

### 2.4.1 Measuring of circular runout on SCB, laser measuring system

- 50 circumferential measurements within 0.8 s
- 8 laser measuring systems maximum
- distance of laser sensors 120 mm minimum
- manual adjustment of laser sensor position in direction of material axis  
2 positions: 10 – 80 mm and 30 – 105 mm
- measuring accuracy, standard deviation  $S_g \leq 0.00375 \text{ mm}$

## 2.4.2 Measuring of perpendicularity on SCB, laser measuring system

- 50 circumferential measurements within 0.8 s
- 2 laser measuring systems maximum, left/right
- manual adjustment of laser sensor position
- measuring accuracy, standard deviation  $S_g \leq 0.00375 \text{ mm}$

## 2.4.3 "Penguin 1" on SCB (patent by RATTUNDE)

Only applicable according to technical description.

Measuring of outside diameter, ovality, wall thickness, inside diameter, laser measuring system

- 4 circumferential measurements within 0.8 s
- 2 laser measuring systems maximum, left/right
- automatic adjustment of laser sensor position
- measuring accuracy outside diameter  $S_g \leq 0.002 \text{ mm}$
- measuring accuracy ovality  $S_g \leq 0.002 \text{ mm}$
- measuring accuracy wall thickness  $S_g \leq 0.003 \text{ mm}$
- measuring accuracy inside diameter  $S_g \leq 0.00375 \text{ mm}$

## 2.4.4 "Penguin 2" on SCB

**The development of "Penguin 2" is still in process!**

Only applicable according to technical description.

Measuring of outside diameter, ovality, wall thickness, inside diameter, length of inside chamfer, angle of inside chamfer, length of outside chamfer, angle of outside chamfer, perpendicularity, laser measuring system

- 50 circumferential measurements within 0.8 s
- minimum chamfer length  $> 0.3 \text{ mm}$
- 2 laser measuring sensors maximum, left/right
- manual adjustment of laser sensor position
- measuring accuracy outside diameter  $S_g \leq 0.002 \text{ mm}$
- measuring accuracy ovality  $S_g \leq 0.002 \text{ mm}$
- measuring accuracy wall thickness  $S_g \leq 0.003 \text{ mm}$
- measuring accuracy inside diameter  $S_g \leq 0.00375 \text{ mm}$
- measuring accuracy perpendicularity  $S_g \leq 0.00375 \text{ mm}$
- measuring accuracy chamfer length  $S_g \leq 0.0075 \text{ mm}$

- measuring accuracy chamfer angle  $Sg \leq 0.188^\circ$

## 2.4.5 Scale for workpieces 12 kg on SCB

- Workpiece diameter 10 - 102 mm  
workpiece 25 to 55 mm/up to 6 kg = one-sided measuring  
workpiece 55 to 2,000 mm/up to 12 kg = double-sided measuring  
can be combined with "Weight check by measuring of diameter"  
(pneumatic cylinder for workpiece positioning at the weighting point)
- maximum charge 25 kg
  - maximum weighing capacity = 12 kg
  - accuracy class according to OIML R60 C3
  - minimum scale internal 0.5 g
  - measuring accuracy, standard deviation  $Sg \leq 0.10 \text{ g}$

## 2.4.6 Scale for workpieces 24 kg on SCB

- Workpiece 25 to 55 mm/up to 12 kg = one-sided measuring  
workpiece 55 to 2,000 mm/up to 24 kg = double-sided measuring  
can be combined with "Weight check by measuring of diameter"  
(pneumatic cylinder for workpiece positioning at the weighting point)
- maximum charge 25 kg
  - maximum weighing capacity = 24 kg
  - accuracy class according to OIML R60 C3
  - minimum scale internal 1.0 g
  - measuring accuracy, standard deviation  $Sg \leq 0.20 \text{ g}$

## 2.4.7 Chamfer measuring device "Flyer" (patent by RATTUNDE) on SCB

Only applicable according to technical description.

Measuring of wall thickness, length of inside chamfer, angle of inside chamfer, length of outside chamfer, angle of outside chamfer, mechanical scanning

- not circumferential, 1 measurement within 0.8 s
- minimum chamfer length  $> 0.3 \text{ mm}$
- 2 laser measuring sensors maximum, left/right
- manual adjustment of position

- measuring accuracy wall thickness       $S_g \leq 0.002 \text{ mm}$
- measuring accuracy chamfer length       $S_g \leq 0.0075 \text{ mm}$
- measuring accuracy chamfer angle       $S_g \leq 0.1^\circ$
- requires 1 clamping device

## 2.4.8 Chip blow on SCB

- requires 1 clamping device

## 2.4.9 Interior cleaning of tubes by means of a pneumatic cylinder, with one stroke (on SCB)

- maximum workpiece length 1,000 mm  
in case of internal diameter  $\varnothing 10\text{-}15 \text{ mm}$
- maximum workpiece length 1,750 mm,  
in case of internal diameter  $\varnothing 15\text{-}102 \text{ mm}$
- requires 1 clamping device per workpiece

Pneumatic cylinder with brush adapter e.g.

Workpiece length	$D_{\text{plunger}}$	$L_{\text{plunger}}$
250 mm	16 mm	250 mm
450 mm	16 mm	450 mm
800 mm	16 mm	800 mm

## 2.4.10 Inside arbor test on SCB

- maximum workpiece length 500 mm
- requires 1 clamping device per workpiece

## 2.4.11 Station for roller-burnishing on SCB

- to press the secondary burr
- maximum depth for roller-burnishing, 50 mm
  - requires 1 clamping device per workpiece



## 2.5 WDM Washing and drying

– maximum workpiece length of the machine (2 m, 2.5 m, 3 m, 3.5 m)

Ø 10 – 25 mm, profile 10x10 - 25x25 mm  
for workpiece lengths > 25 mm

Ø 25 – 108 mm, profile 25x25 – 80x80 mm, 120x62 mm  
for workpiece lengths > 10 mm

Temperature of washing agent 90°C maximum (in general 60 - 75°C)

Air temperature of dryer 300°C maximum

Material of washing machine 1.4301 (AISI 304)

Only use washing agents with a corrosion resistance of 1.4301 (AISI 304)

Proportion of water in washing agent  $\geq 80\%$

Do not use any solvent-containing or flammable washing agents

possible combinations for WDM

BDM → WDM

CFM → WDM

SCB → WDM

WDM → Container

WDM → TI

WDM → SRT

## 2.6 TI Table for visual inspection in front of stacking robot SRT

Dimensions in m: B (depending on work piece length)= xx x L=1.6 m x H= 1.1 m

– maximum workpiece length of the machine (2 m, 2.5 m, 3 m, 3.5 m)

manually accessible lateral transfer with a transfer length of 1.6 m

possible combinations for TI

BDM → TI

CFM → TI

SCB → TI



WDM → TI  
TI → SRT

## 2.7 SRT Stacking robot

Stacking of workpieces with horizontal layers/ in all types of containers accessible from the top/ lines, columns/ turns/ up to 6 different patterns for each layer/ mirror-imaging of complete layers/ stacking of hexagonal bundles in 6 different patterns/ stacking of octagonal bundles in 6 different patterns/ with or without driven roller conveyor for automatic container change (CC or CCB)/ maximum lifting capacity 75 kg/ possible quantity of workpieces per container will be calculated automatically/ with magnetic gripper/ connection for pneumatic suction cups available

Combinations and container sizes:

+SRT/xx	B=1.2 m x L=xx+0.2 m x H=1.4 m
+SRTH/xx	B=1.2 m x L=xx+0.2 m x H=1.7 m
+SRTB/xx	B=1.5 m x L=xx+0.2 m x H=1.4 m
+SRTBH/xx	B=1.5 m x L=xx+0.2 m x H=1.7 m
+SRT/xx +CC/xx above floor	B=1.2 m x L=xx+0.2 m x H=1.1 m
+SRT/xx +CC/xx below floor	B=1.2 m x L=xx+0.2 m x H=1.4 m
+SRTH/xx +CC/xx above floor	B=1.2 m x L=xx+0.2 m x H=1.4 m
+SRTH/xx +CC/xx below floor	B=1.2 m x L=xx+0.2 m x H=1.7 m
+SRTB/xx +CCB/xx above floor	B=1.5 m x L=xx+0.2 m x H=1.1 m
+SRTB/xx +CCB/xx below floor	B=1.5 m x L=xx+0.2 m x H=1.4 m
+SRTBH/xx +CCB/xx above floor	B=1.5 m x L=xx+0.2 m x H=1.4 m
+SRTBH/xx +CCB/xx below floor	B=1.5 m x L=xx+0.2 m x H=1.7 m

Limitations for stacking of workpieces:

- SRT and SRTH are only able to stack workpieces  $\leq 1,200$  mm turned by  $90^\circ$
- SRTB and SRTBH are only able to stack workpieces  $\leq 1,500$  mm turned by  $90^\circ$
- "SRT sampling from safety area" limits the stacking area by approx. 100 mm
- with the maximum container size, the SRT is not able to move into the corners of the container. This might limit the stacking of very short workpieces which have been turned by  $90^\circ$ .

possible combinations for SRT

BDM → SRT  
 CFM → SRT  
 SCB → SRT  
 WDM → SRT  
 TI → SRT

## 2.8 CC /xx/x/x / CCB/xx/x/x Driven roller conveyor for automatic container change

xx – maximum workpiece length in the machine (2 m, 2.5 m, 3 m, 3.5 m)

+CC requires +SRTH or +SRT  
 +CCB requires +SRTBH or +SRTB

Container sizes see 2.7 Stacking robot

Minimum breadth of container foot in moving direction 80 mm

Variations:

CC/xx/3/1/EU or CSA	3 container positions, 1 drive, EU standard or CSA standard
CC/xx/3/3/EU or CSA	3 container positions, 3 drives, EU standard or CSA standard
CC/xx/5/5/EU or CSA	5 container positions, 5 drives, EU standard or CSA standard
CC/xx/6/5/EU or CSA	6 container positions, 5 drives, EU standard or CSA standard
CC/xx/7/5/EU or CSA	7 container positions, 5 drives, EU standard or CSA standard
CCB/xx/3/1/EU or CSA	3 container positions, 1 drive, EU standard or CSA standard
CCB/xx/3/3/EU or CSA	3 container positions, 3 drives, EU standard or CSA standard
CCB/xx/5/5/EU or CSA	5 container positions, 5 drives, EU standard or CSA standard
CCB/xx/6/5/EU or CSA	6 container positions, 5 drives, EU standard or CSA standard
CCB/xx/7/5/EU or CSA	7 container positions, 5 drives, EU standard or CSA standard

- installation above and below floor
- in case of installation above floor underclearance 120 mm for "powered pallet truck"
- installation distance from SRT posts 100 mm
- if "SRT sampling from safety area" is used the installation distance from SRT posts must be 10 mm
- "SRT sampling from safety area" may limit the stacking area

Options:

- CC Extension of the driven roller conveyor for automatic container change by one container-position
- Extension of the driven roller conveyor for automatic container change by one container-position, broad

## 3. *Tools ACS Sawing machine*

### 3.1 *Clamping tools grip feeder and saw*

1 set of clamping tools for the sawing machine comprising  
1 pair of clamping jaws for the grip feeder and  
1 pair of jaws for the saw clamp  
prismatic clamping jaws, shaped clamping jaws, special clamping jaws  
for various length ranges of workpieces  
standard grading of prismatic clamping jaws = 10 mm  
in case of a stroke of 10 mm

Polishing and coating with TIN at an extra charge

1 set of clamping tools for sawing machine for multiple cut comprising  
1 pair of jaws for grip feeder and  
1 pair of jaws for the saw clamp  
1 pair of jaws for the ACS discharge handling system  
1 set pre-centering device multiple cut  
shaped clamping jaws for various length ranges of workpieces  
clamping range, see 2.2.1 / 2.2.2 / 2.2.3 / 2.2.4 / 2.2.5,  
in case of a stroke of 10mm

Polishing and coating with TIN at an extra charge

### 3.2 *Clamping tools ACS discharge handling system*

1 pair of clamping tools for the ACS discharge handling system  
prismatic clamping jaws, shaped clamping jaws, special clamping jaws  
for various length ranges of workpieces  
standard grading of prismatic clamping jaws = 10 mm  
in case of a stroke of 10 mm

Polishing and coating with TIN at an extra charge

### *3.3 Tools BDM brush-deburring machine*

1 set of transport discs for the BDM brush-deburring machine

Polishing and coating with TIN at an extra charge

Roller brushes for mild steel, 2 pieces required  
steel wire trimming  
diameter 300 mm, length 600 mm

Roller brushes for stainless steel, 2 pieces required  
steel wire trimming  
diameter 300 mm, length 600 mm

1 set of transport discs made of PA

### *4. CFM chamfering machine*

#### *4.1 Prismatic clamping tools CFM chamfering machine*

1 set of clamping jaws for the CFM chamfering machine, comprising  
1 pair for the left side and 1 pair for the right side  
for various length ranges of workpieces  
standard grading of prismatic clamping jaws = 5 mm  
in case of a stroke of 10 mm

Polishing and coating with TIN at an extra charge

#### *4.2 Shaped clamping tools CFM chamfering machine*

1 set of retainer jaws for removable shells  
for the CFM chamfering machine, comprising  
1 pair of retainer jaws for removable shells for the left side and  
1 pair of retainer jaws for removable shells for the right side

1 set of shaped clamping tools  
for the CFM chamfering machine, comprising  
1 pair of shaped clamping tools for the left side and  
1 pair of shaped clamping tools for the right side  
for one workpiece dimension

#### 4.3 *Clamping tools CFM discharge handling system*

1 pair of clamping tools for the CFM discharge handling system  
prismatic clamping jaws, shaped clamping jaws, special clamping jaws  
for various length ranges of workpieces  
standard grading of prismatic clamping jaws = 10 mm  
in case of a stroke of 10 mm

Polishing and coating with TIN at an extra charge

#### 4.4 *End machining heads and accessories for HSK-C 80*

PRICES DEPENDING ON MANUFACTURER!  
Gühring or Leistritz, other manufacturers need approval

1 set of end machining heads for HSK-C 80  
for workpiece diameter  $\varnothing$  10 - 102 mm comprising  
1 item for the left side and 1 item for the right side  
diameter  $\varnothing$  120 mm, including three **nests** for tool holders  
incl. 3 standard tool holders (Holder for facing 90° / holder for OD chamfering 45° /  
holder for ID chamfering 45°)

with adapter HSK-C 80

Overrunning ID chamfering tool for end machining head optionally possible

#### 4.5 *CFM curve*

Tool holder for curve head (standard)  
Holder for facing 90° / holder for OD chamfering 45° / holder for ID chamfering 45°



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Tool holder for curve head (special design)  
-all angles differing from the angles above

Overrunning ID chamfering tool for curve head (only for CFMcurve) optionally possible

## 4.6 Auxiliary equipment

Equipment for presetting produced by KELCH, optical  
on demand, can also be ordered by the customers directly at the manufacturer

## 5. Saw blades

Saw blades HSSE service life approx. 1-12 m<sup>2</sup>, depending on quality of material  
Saw blades HM service life approx. 4-40 m<sup>2</sup>, depending on quality of material

The following limits must be observed:

ACS<sup>®</sup>102 + BDM Sawing + Brush-deburring  
Saw blade  $D_{\max} = 400$  mm  
Recommendation: 350 - 360 mm  
Saw blade brush is can be used between 340 and 360 mm

ACS<sup>®</sup>102+ CFM Sawing + Chamfering  
ACS<sup>®</sup>102+ CFMcurve Sawing + Chamfering / Curve-machining  
Saw blade  $D_{\max} = 370$  mm  
Recommendation: 350 - 360 mm  
Saw blade brush is can be used between 340 to 360 mm  
Chamfering head  $D_{\max} = 120$  mm

Maximum saw blade thickness (cutting width): 3 mm  
Recommended saw blade thickness: 2.5 mm for HSSE / 2.7 mm for HM

Saw blade bore and pinhole pattern: 50H6, 4 secondary holes D15 mm on an 80 mm bolt circle  
Diameter of saw blade flange = 140 mm





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## General recommendations for saw blade selection

- for HSS saw blades always use HSS/E quality
- always use HSS and HM saw blades with full coating, even after resharpening
- standard quality equal or better than 0.1 mm
- tooth shape: chip breaker

## NOTE!

Many factors must be considered when selecting a provider, including:

Quality, reliability, accuracy, service life, advice, price, resharpening service, recoating, availability etc.

## Calculation of minimum saw blade diameter:

Saw blade diameter range

D= 315 - 400 mm (BDM)

Saw blade diameter range

D= 315 - 370 mm (CFM/CFMcurve)

Minimum saw blade diameter for material diameter

10 - 67 mm = 315 mm

Minimum saw blade diameter for material diameter

67 - 71.5 mm = 248+D mm

Minimum saw blade diameter for material diameter

71.5 - 81.5 mm = 242+D mm

Minimum saw blade diameter for material diameter

81.5 - 88 mm = 238+D mm

Minimum saw blade diameter for material diameter

88 - 120 mm = 148+2xD mm

Please note: Observe limit values for material diameter

ACS: Ø120 mm

ACS+LM: Ø105 mm

ACS+BDM: Ø102 mm

ACS+CFM: Ø102 mm

ACS+CFMcurve: Ø102 mm

For material dimensions exceeding 90 mm, 370 mm saw blades should be ordered.

We recommend the use of application-specific saw blades.

Saw blade manufacturer recommendations on request.

## Cutting parameters saw

Saw blade diameter 350mm – cutting speed, maximum: 318 m/min

Saw blade diameter 370mm – cutting speed, maximum: 337 m/min

Saw blade diameter 400mm – cutting speed, maximum: 364 m/min

Feed per tooth fz, max: 0.4 mm/tooth

Maximum mechanical power of the saw: 18 kW



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## Cutting parameters chamfering machine

	If balanced	If unbalanced
If workpiece diameter is 30mm	Cutting speed of chamfering tool is 320 m/min	Cutting speed of chamfering tool is 225m/min

Maximum torque chamfering tool: 160 Nm

### *6. Finishing accuracy*

Reference workpiece  $D_a = 50$  mm

ACS®102	Sawing
ACS®102 + LM	Sawing+Length measuring length tolerance of workpiece: +/- 0.05 mm +/- 0.15 mm at $C_{mk}$ 1.67; standard deviation 0.03 mm
ACS®102+ BDM	Sawing+Brush-deburring length tolerance of workpiece: +/- 0.05 mm +/- 0.15 mm at $C_{mk}$ 1.67; standard deviation 0.03 mm
ACS®102+ CFM	Sawing+Chamfering length tolerance of workpiece: +/- 0.02 mm +/- 0.05 mm at $C_{mk}$ 1.67; standard deviation 0.01 mm
ACS®102+ CFMcurve	Sawing+Chamfering /Curve-machining length tolerance of workpiece: +/- 0.02 mm +/- 0.05 mm at $C_{mk}$ 1.67; standard deviation 0.01 mm



## 7. Production output

ACS®102	Sawing minimum cycle time = 1.1 s;	3,000 pcs/h maximum double cut 6,000 pcs/h maximum triple cut 7,500 pcs/h maximum quad-cut 12,000 pcs/h maximum
ACS®102 + LM	Sawing+Length measuring minimum cycle time = 1.35 s;	2,500 pcs/h maximum double cut 5,000 pcs/h maximum triple cut 6,250 pcs/h maximum quad-cut 9,000 pcs/h maximum
ACS®102+ BDM	Sawing+Brush-deburring minimum cycle time = 1.35 s;	2,500 pcs/h maximum double cut 5,000 pcs/h maximum triple cut 6,250 pcs/h maximum quad-cut 9,000 pcs/h maximum

Double or quadruple quantities are not automatically achieved. The special production output has always to be calculated.

ACS®102+ CFM	Sawing+Chamfering minimum cycle time = 1.78 s;	2,000 pcs/h maximum
ACS®102+ CFMcurve	Sawing+Chamfering / Curve-machining minimum cycle time = 1.78 s;	2,000 pcs/h maximum

## 8. Sound level

86 dBA, with ACS Additional provisions for acoustic insulation reduction of acoustic emission to 83 dBA, but at extra cost!

Both without colliding of material on BM bundle loading magazine

As we emit noise far beyond 70dB(A) with the ACS saw machining centre and partly also clearly beyond 80 dB(A) we are obligated to indicate the equivalent continuous sound pressure level at particular points in the machine environment according to the





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## European Directives and Safety Standards for Machines 11<sup>th</sup> revised edition July 2008

Explanatory notes concerning the Machinery Directive and standardization  
Survey of the EC directives and standards institutions  
in the environment of mechanical engineering  
Standards programme concerning the EC Machinery Directive

We need **not** fall below 80 dB(A), only the manner of designation of the reached values is regulated.

<70 dB(A) => indication "70 dB(A)"

>70 dB(A) => indication of the actual value according to the machine conditions and the specified procedures

These values must be included in the operating instructions.

### *9. Energy consumption*

The actual load is significantly less than the power requirements.

This is achieved by energy recovery from the braking energy of the servo drives. In addition, the idle power of the servo drives (not that of the other drives) is compensated in the Sinumerik.

The energy consumption of both the washing machine and the dryer depends strongly on the temperature settings and on the combination of production rate and workpiece weight.

For ex. tube 76 x 4 x 1,080 mm St37 from master length 12,300 mm with 969 pieces per hour requires a power of approx. 46 kW in the washing machine to warm up the tubes from 20 to 65°C.

This is 7.4 t of steel which must to be heated up from 20 to 65°C within one hour.

For ex. tube 20 x 2 x 500 mm ST37 from HL 6,500 mm with 1,743 pieces per hour requires a power of approx. 4kW in the washing machine in order to heat the tubes from 20°C to 65°C.

The maximum heating capacity of the washing machine is 40 kW.

However, only the power to maintain the set temperature is consumed.

The heating capacity of the dryer has a maximum of 33 kW and can be adjusted.





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The setting is made directly according to specifications for the air temperature from 0 to 300°C.

Customer feedback indicating that our competitors use less energy can be put into perspective by looking at the individual production capacity in pieces per hour. To heat a workpiece from 20°C to 65°C, the same amount of energy is always required; we just do it faster.

## Power requirements for ACS® basic models, without WDM

		3x400V 50Hz	3x460V 60Hz	Transformer 3pha. prim. 575V// sec. 460V 60Hz
ACS®102...	40 kVA	approx. 60 A	approx. 52 A	41 A // 52 A
ACS®102...+LM	40 kVA	approx. 60 A	approx. 52 A	41 A // 52 A
ACS®102...+BDM	60 kVA	approx. 87 A	approx. 77 A	82 A // 103 A
ACS®102...+CFM	60 kVA	approx. 87 A	approx. 77 A	82 A // 103 A
ACS®102...+CFMcurve	60 kVA	approx. 87 A	approx. 77 A	82 A // 103 A
ACS®102...+CFM+BDM	78 kVA	approx. 115 A	approx. 100 A	82 A // 103 A
ACS®102...+CFMcurve+BDM	78 kVA	approx. 115 A	approx. 100 A	82 A // 103 A

## Power requirements for ACS® basic models, with WDM

		3x400V 50 Hz	3x460V 60 Hz	Transformer 3pha. prim. 575V// sec. 460V 60Hz
ACS®102...+BDM ...+WDM	147 kVA	approx. 219 A	approx. 188 A	155 A // 193 A
ACS®102...+CFM ...+WDM	147 kVA	approx. 219 A	approx. 188 A	155 A // 193 A
ACS®102...+CFMcurve...+WDM	147 kVA	approx. 219 A	approx. 188 A	155 A // 193 A
ACS®102...+CFM+BDM... +WDM	168 kVA	approx. 247 A	approx. 217 A	155 A // 193 A
ACS®102...+CFMcurve+BDM... +WDM	168 kVA	approx. 247 A	approx. 217 A	155 A // 193 A

## Compressed air requirements

ACS®102...	approx. 3.5 - 4 m <sup>3</sup> /min
ACS®102...+LM	approx. 3.5 - 4 m <sup>3</sup> /min
ACS®102...+BDM	approx. 3.5 - 4 m <sup>3</sup> /min
ACS®102...+CFM	approx. 5.5 - 6 m <sup>3</sup> /min
ACS®102...+CFMcurve	approx. 5.5 - 6 m <sup>3</sup> /min
ACS®102...+CFM+BDM	approx. 5.5 - 6 m <sup>3</sup> /min
ACS®102...+CFMcurve+BDM	approx. 5.5 - 6 m <sup>3</sup> /min
3.5 m <sup>3</sup> /min corresponds to an electrical demand of approx.	24.5 kW
5.5 m <sup>3</sup> /min corresponds to an electric al demand of approx.	38.5 kW

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## Comment:

The compressed air consumption may be altered via operator adjustments for ex. some blowers may not be required.

## *10. Operating supplies*

### **Initial equipment**

The following operating supplies are required for the base machine:

PLANTO HYD 46 S Fuchs Europe Schmierstoffe GmbH phone: +49 621 37 01-0  
- clamping devices for grip feeder, saw clamp and valve blocks; 3.0 l capacity  
The use of alternative products is possible in consultation with Rattunde & Co GmbH.

WEDOLIT N52 Wilhelm-Dietz GmbH & Co KG phone: +49 211 71 72 77  
- for micro-spray lubrication; a tank of 30 l capacity  
The use of alternative products is possible in consultation with Rattunde & Co GmbH.

WEDOLIT K88 Wilhelm-Dietz GmbH & Co KG phone: +49 211 71 72 77  
WEDOLIT K102 Wilhelm-Dietz GmbH & Co KG phone: +49 211 71 72 77  
- for micro-spray lubrication; a tank 7% / 93% distilled water; 30 l capacity  
The use of alternative products is possible in consultation with Rattunde & Co GmbH.

Microlube GL 261 Klüber phone: +49 89 78 76-598  
- Central lubricating system for ball screws and linear guides and for the clamping devices; 3 kg capacity  
The use of alternative products voids the guarantee.

MOLYCOTE DX Dow Corning GmbH Wiesbaden phone: +49 611 237 1  
- grease gun for BM bundle loading magazine height adjustment  
The use of alternative products voids the guarantee.

SYNTHESO D 220 EP Klüber phone: +49 89 78 76-598  
- saw gear box, 10 l capacity  
The change of the oil is only necessary following 2 years or 10,000,000 pieces, whichever comes first.  
The use of alternative products voids the guarantee.

### **Washing agents for WDM**



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It is not possible to provide detailed information as customers have a wide range of applications. We use, for example, a ratio of 7% Wedolit K911/Wedolit K102 : 93% water. This corresponds to 100 liters of K911 for one WDM filling (1,400 liters capacity for workpiece length of 2,000 mm). Depending on application this filling lasts 1 to 6 months.

- Water consumption approx. 10 - 100 l/day depending on application

## 11. Set-up times

ACS® 102	Sawing	
ACS® 102+LM	Sawing+Length measuring	
Saw blade changeover:		2 min.
Length changeover, without change of diameter range of the clamping tools:		2 min.
Diameter changeover within the diameter range of the clamping tools:		2 min.
Product changeover, including change of all clamping tools:		7 min.
Bundle loading magazine changeover for multiple cut		5 min.

ACS® 102+BDM	Sawing+Brush-deburring	
Saw blade changeover:		2 min.
Length changeover, without change of diameter range of the clamping tools:		2 min.
Diameter changeover within the diameter range of the clamping tools:		2 min.
Product changeover, including change of all clamping tools:		7 min.
Transport disc changeover:		7 min.
Roller brush changeover:		50 min.
Bundle loading magazine changeover for multiple cut		5 min.

ACS® 102+CFM	Sawing+Chamfering	
Saw blade changeover:		2 min.
Length changeover, without change of diameter range of the clamping tools:		2 min.
Diameter changeover within the diameter range of the clamping tools:		2 min.
Product changeover, including change of all clamping tools:		15 min.
Machining head changeover:		4 min.





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ACS®102+CFMcurve      Sawing+Chamfering / Curve-machining

Saw blade changeover:	2 min.
Length changeover, without change of diameter range of the clamping tools:	2 min.
Diameter changeover within the diameter range of the clamping tools:	2 min.
Product changeover, including change of all clamping tools:	15 min.
Change of CFMcurve tool holders	12 min.

ACS®102+CFM+BDM      Sawing+Chamfering+Brush-deburring

Saw blade changeover:	2 min.
Length changeover, without change of diameter range of the clamping tools:	2 min.
Diameter changeover within the diameter range of the clamping tools:	2 min.
Product changeover, including change of all clamping tools:	15 min.
Machining head changeover:	4 min.
Transport disc changeover:	7 min.
Roller brush changeover:	50 min.
Bundle loading magazine changeover for multiple cut	5 min.

ACS®102+CFMcurve+BDM      Sawing+Chamfering / Curve-machining + Brush-deburring

ACS®102+CFM+BDM      Sawing+Chamfering+Brush-deburring

Saw blade changeover:	2 min.
Length changeover, without change of diameter range of the clamping tools:	2 min.
Diameter changeover within the diameter range of the clamping tools:	2 min.
Product changeover, including change of all clamping tools:	15 min.
Change of CFMcurve tool holders	12 min.
Transport discs changeover:	7 min.
Roller brush changeover:	50 min.
Bundle loading magazine changeover for multiple cut	5 min.



## 12. Summary basic combinations

ACS<sup>®</sup>102/xx/BMyy → Container

ACS<sup>®</sup>102/xx/BMyy+LM → Container

ACS<sup>®</sup>102/xx/BMyy+LM +SCB → Container

ACS<sup>®</sup>102/xx/BMyy+LM +SCB +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+LM +SCB +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+LM +SCB (+TI)\* +SRT (+CC)\*

ACS<sup>®</sup>102/xx/BMyy+LM +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+LM +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+LM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+BDM → Container

ACS<sup>®</sup>102/xx/BMyy+BDM +SCB → Container

ACS<sup>®</sup>102/xx/BMyy+BDM +SCB +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+BDM +SCB +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+BDM +SCB (+TI)\* +SRT (+CC)\*

ACS<sup>®</sup>102/xx/BMyy+BDM +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+BDM +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+BDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFM → Container

ACS<sup>®</sup>102/xx/BMyy+CFM +SCB → Container

ACS<sup>®</sup>102/xx/BMyy+CFM +SCB +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+CFM +SCB +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFM +SCB (+TI)\* +SRT (+CC)\*

ACS<sup>®</sup>102/xx/BMyy+CFM +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+CFM +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +SCB → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +SCB +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +SCB +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +SCB (+TI)\* +SRT (+CC)\*

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +WDM → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve +WDM (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFMcurve (+TI)\* +SRT (+CC)\* → Container

ACS<sup>®</sup>102/xx/BMyy+CFM+BDM → Container



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ACS® 102/xx/BMyy+CFM+BDM +SCB → Container  
ACS® 102/xx/BMyy+CFM+BDM +SCB +WDM → Container  
ACS® 102/xx/BMyy+CFM+BDM +SCB +WDM (+TI)\* +SRT (+CC)\* → Container  
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