



DIPLOMATIC
AUTOMAZIONE



"B" AXIS

TURN-MILL MULTIFUNCTION UNIT
FOR CNC TURNING CENTERS



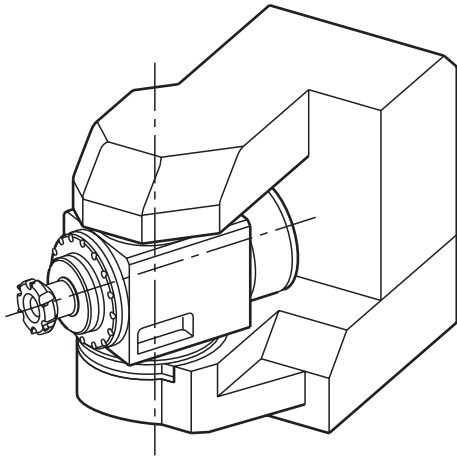
TECHNICAL INFORMATION

I.T. 6473



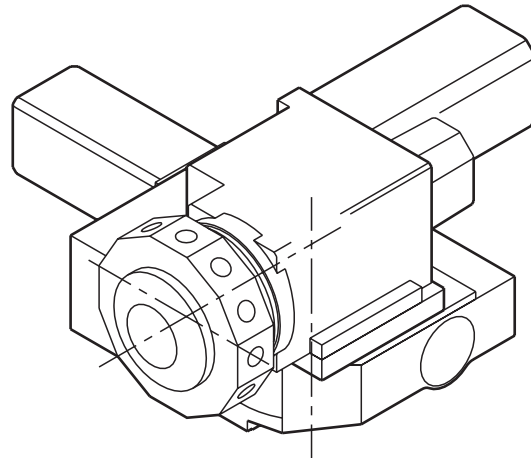
ISSUED **07-05**

**“B” AXIS
TURN-MILL MULTIFUNCTION UNIT
FOR CNC TURNING CENTERS**



RV-B “B” AXIS WITH TURRET

ES-B “B” AXIS WITH ELECTROSPINDLE



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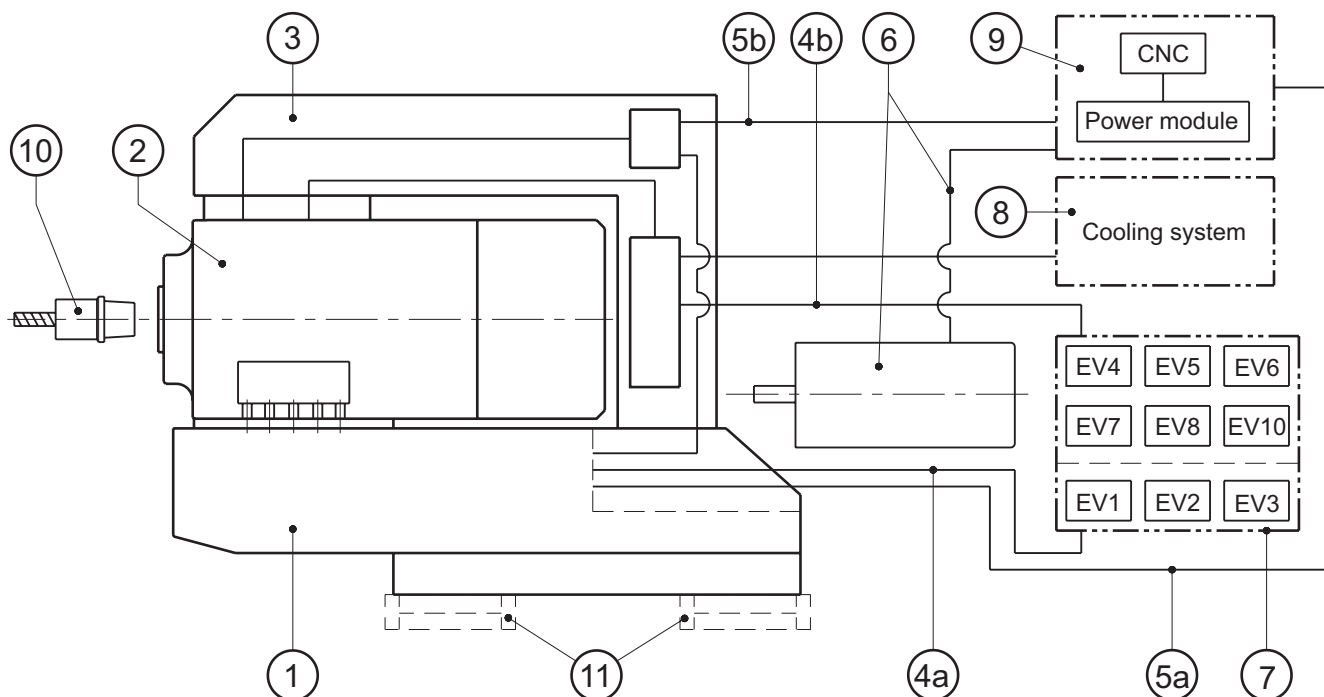
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ES-B “B” AXIS WITH ELECTROSPINDLE SUPPLY COMPOSITION



DIPLOMATIC SUPPLY

- (1) **ES-B20** Table (with interface group for Servomotor).
- (2) **ES-20** Electrospindle.
- (3) Main cover and connections group.

EXCLUDED

- (4.a) **ES-B20** Table - Hydraulic pipelines.
- (4.b) **ES-20** Electrospindle - Hydraulic pipelines.
- (5.a) **ES-B20** Table - Electrical connections.
- (5.b) **ES-20** Electrospindle - Electrical connections.
- (6) Servomotor for table and its electrical connections.
- (7) Hydraulic equipment and power pack.
- (8) Electrospindle cooling system.
- (9) Power modules.
- (10) Tools.
- (11) Joint components to machine axis.

ES-B “B” AXIS WITH ELECTROSPINDLE TECHNICAL DATA

“ES-B” TABLE

| Size | | ES-B20 |
|--|-----------------|---------------------------------|
| Rotation direction | | Bidirectional |
| Angular stroke | Deg° | ± 102,5° |
| Angular position : • Index clamping • Brake clamping | – Resolution | every 5° 0,001° |
| Operating times : (1) Table rotation • one step index time (including acc. / dec.) 90° | s | 0,80 |
| • step-less rotation time 45° | s | 0,25 |
| Table clamping or unclamping | s | 0,20 |
| Table preloading for interpolation | s | 0,20 |
| Positioning accuracy (index clamping) | Deg.° | ± 4" |
| Repeatability accuracy (index clamping) | Deg.° | ± 1,5" |
| Positioning accuracy (brake clamping) | Deg.° | ± 8" |
| Transmission ratio: Worm drive | τ | 1 : 60 |
| Total | τ | 1 : 90 |
| Max motor speed : • positioning • interpolating | RPM RPM | 2.700 500 |
| Angular transducer : Incremental pulse coder | | 512 ppr - resolut. 0,001° |
| Motor (optional) : (2) SIEMENS | | 1FK 6083 / 1FT 6084 |
| Hydraulic working pressure | bar | 50 ^{+20%} ₀ |
| Ambient temperature range | ° C | 5 ÷ 40 |

- (1) Conditions :
 - Proper servomotor.
 - Hydraulic supply properly sized.
 - Without dead-times caused by machine CNC.

- (2) Different motor types, on request.

ES-B “B” AXIS WITH ELECTROSPINDLE TECHNICAL DATA

“ES” ELECTROSPINDLE

| Size | | ES-20 |
|--|--|--|
| Tooling system (1) | | CAPTO C5 CAPTO C6 HSK 63A KM 63 ISO 40 |
| Drive : | | |
| First option | <ul style="list-style-type: none"> Synchronous spindle motor SIEMENS (see diagram sheet 6) Max speed | RPM 7.000 |
| Second option | <ul style="list-style-type: none"> Synchronous spindle motor SIEMENS (see diagram sheet 7) Max speed | RPM 12.000 |
| Transducer : Incremental pulse coder | | 360 ppr - resolution 0,001° |
| Angular position : | | |
| • Index clamping | Deg.° | every 45° |
| Electrospindle clamping or unclamping time (2) | s | 0,20 |
| Positioning accuracy (index clamping) | Deg.° | ± 4" |
| Repeatability accuracy (index clamping) | Deg.° | ± 1,6" |
| Hydraulic working pressure (3) | bar | 50 ^{+20%} ₀ |
| Auxiliary services : | | |
| • Pressurizing air | bar | 0,5 ÷ 1,0 |
| • Tool change cleaning air | bar | 8 max |
| • Tool external coolant | bar | 25 max |
| • Tool internal coolant | bar | 80 max |
| • Motor cooling | l/min bar | Water 75% - Anti-corr. agent 25% 8 7 max |

(1) Different types, on request.

(2) Conditions :

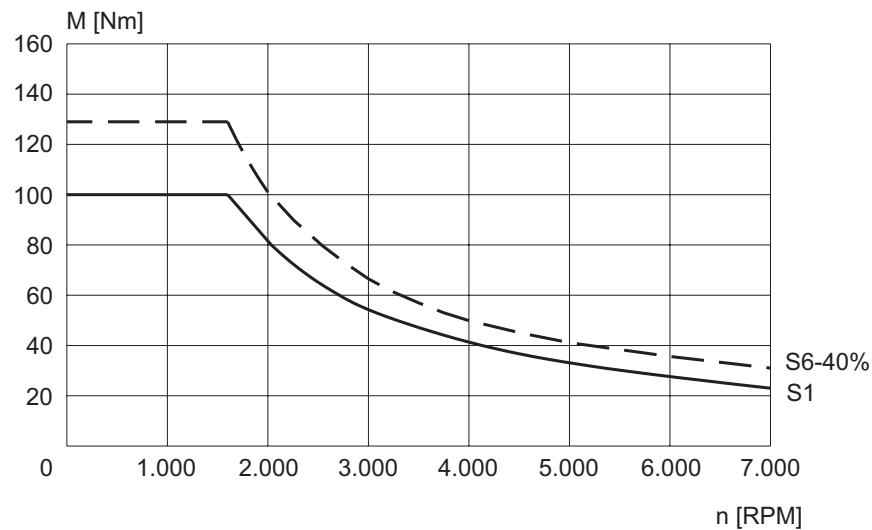
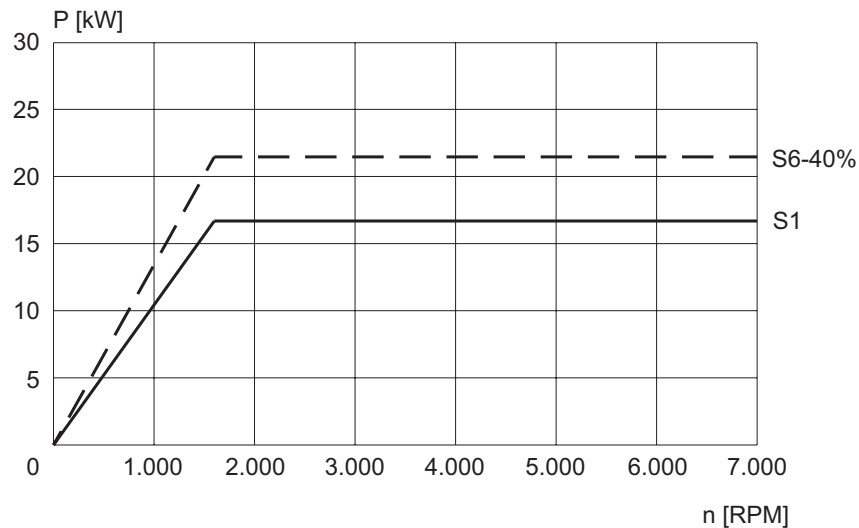
- Hydraulic supply properly sized.
- Without dead-times caused by machine CNC.

(3) For tool clamping / unclamping Pmax = 70 bar.

ES-B "B" AXIS WITH ELECTROSPINDLE SPINDLE MOTOR TECHNICAL DATA

FIRST OPTION : DIAGRAM MOTOR TYPE "1FE 1093-6WV11"

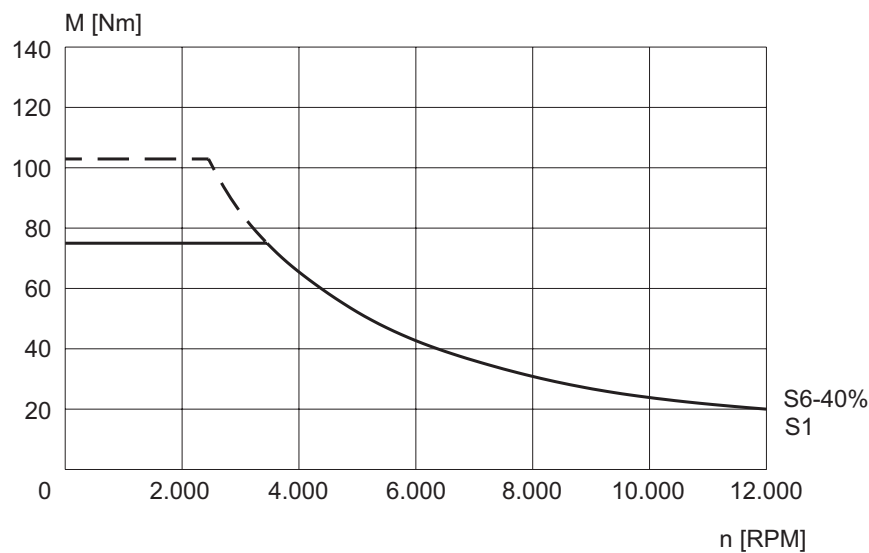
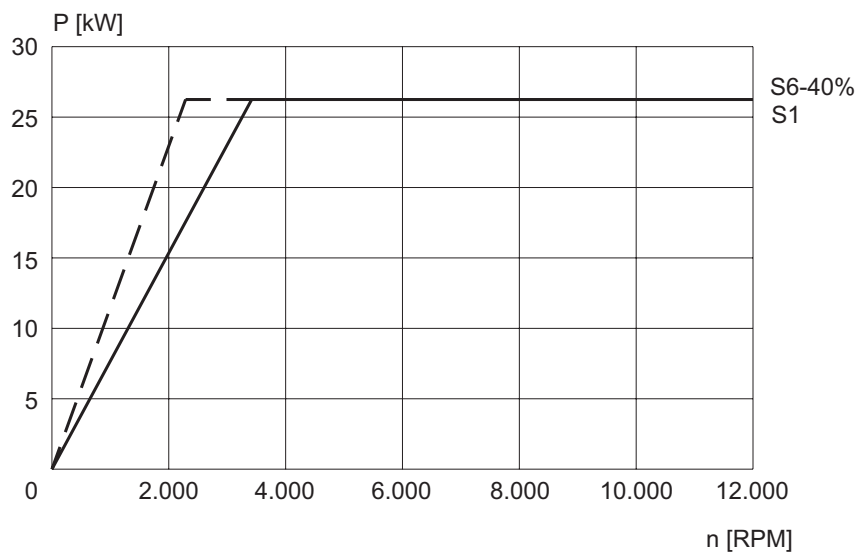
| | | | |
|-------------|----------|-----|-------|
| Poles | | N° | 6 |
| Power | P rated | kW | 16,8 |
| | P S6-40% | | 22,0 |
| Torque | M rated | Nm | 100 |
| | M S6-40% | | 128 |
| Current | I rated | A | 42 |
| | I S6-40% | | 60 |
| Rated speed | n rated | RPM | 1.600 |
| Max. speed | n max | RPM | 7.000 |



ES-B "B" AXIS WITH ELECTROSPINDLE SPINDLE MOTOR TECHNICAL DATA

SECOND OPTION : DIAGRAM MOTOR TYPE "1FE 1093-4WN11"

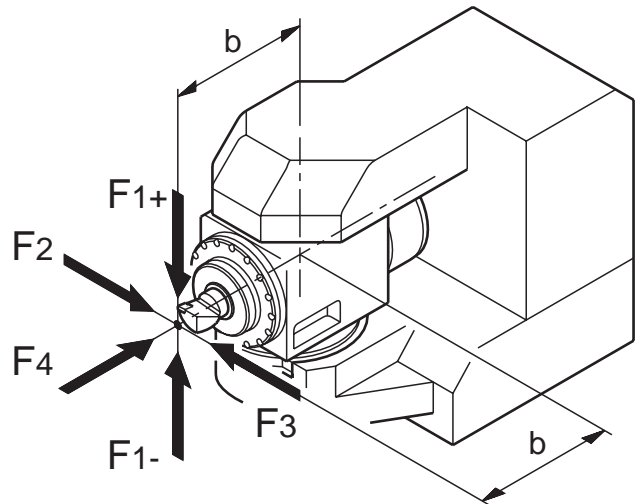
| | | | |
|-------------|-----------|-----|--------|
| Poles | | N° | 4 |
| Power | P rated | kW | 26 |
| | P S6-40% | | 26 |
| Torque | M rated | Nm | 75 |
| | M S6-40% | | 103 |
| Current | I rated | A | 60 |
| | I S6-40% | | 86 |
| Rated speed | n rated | RPM | 3.300 |
| Max. speed | n max | RPM | 12.000 |



ES-B20 "B" AXIS WITH ELECTROSPINDLE LOADING CAPACITY

TURNING OPERATIONS

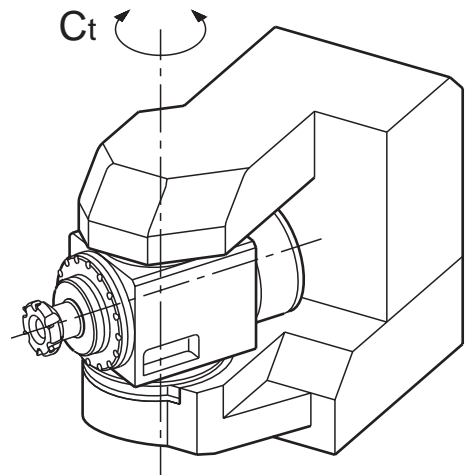
- "ES-B" indexed table
- Indexed Electrospindle



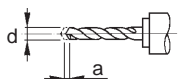
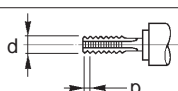
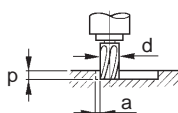
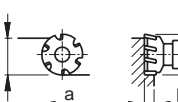
| | | | | | |
|------------------------------|-------------------------------|----|--------|------------------------------|--------------------------|
| Max tilting torque (to push) | $(F1+ \times b)$ | Nm | 4.000 | $F1+ = 17.400 \text{ N}$ | for $b = 230 \text{ mm}$ |
| Max tilting torque (to lift) | $(F1- \times b)$ | Nm | 2.500 | $F1- = 10.800 \text{ N}$ | for $b = 230 \text{ mm}$ |
| Max tangential torque | $(F2 \times b) (F3 \times b)$ | Nm | 3.500 | $F2 = F3 = 15.200 \text{ N}$ | for $b = 230 \text{ mm}$ |
| Max radial tilting force | $F4$ | N | 18.000 | | |

ROTATING TOOL OPERATIONS

- Max tangential torque (for the table) :
 - Index clamping $C_t = 3.500 \text{ Nm}$
 - Brake clamping $C_t = 1.000 \text{ Nm}$
 - Interpolation $C_t = 1.300 \text{ Nm}$



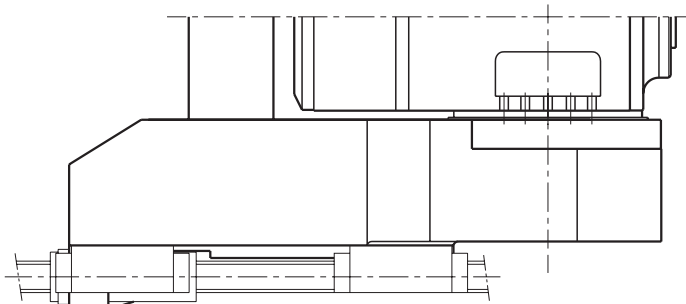
INDICATIVE CUTTING CAPACITY for 600 N/mm² steel.

| OPERATION | Tool type | 7.000 (RPM) | 12.000 (RPM) |
|--|---------------------------|--|--|
| DRILLING  $d \times a$ [mm] x [mm/u] | HSS tools Insert tools | $\varnothing 30 \times 0,25$ (260 RPM) $\varnothing 40 \times 0,16$ (200 RPM) | $\varnothing 30 \times 0,20$ (260 RPM) $\varnothing 40 \times 0,14$ (200 RPM) |
| TAPPING  $d \times p$ [mm] x [mm] | | M22 x 2,5 M36 x 2,0 | M20 x 2,5 M30 x 2,0 |
| MILLING end mill  $d \times p \times a$ [mm] x [mm] x [mm/min] | HSSE mill Insert mill | $30 \times 20 \times 100$ (350 RPM) $40 \times 40 \times 220$ (1.300 RPM) | $30 \times 20 \times 70$ (300 RPM) $40 \times 40 \times 100$ (1.000 RPM) |
| MILLING face mill  $d \times p \times a$ [mm] x [mm] x [mm/min] | Insert mill | $80 \times 6 \times 500$ (800 RPM) | $80 \times 4 \times 420$ (700 RPM) |

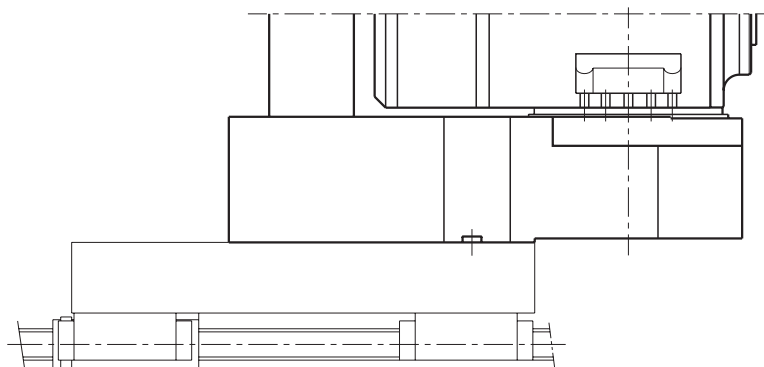
ES-B20 “B” AXIS WITH ELECTROSPINDLE TABLE VERSIONS

TURNING CENTER APPLICATION

A) “INTEGRATED AXIS” VERSION

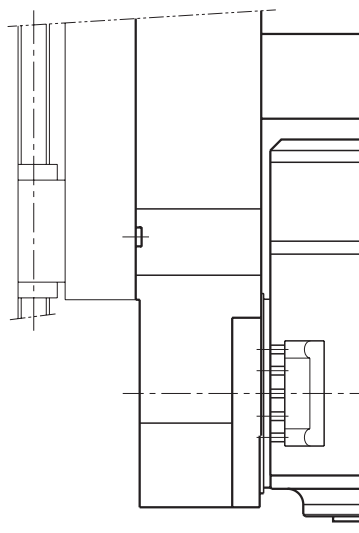


B) “FLAT” VERSION

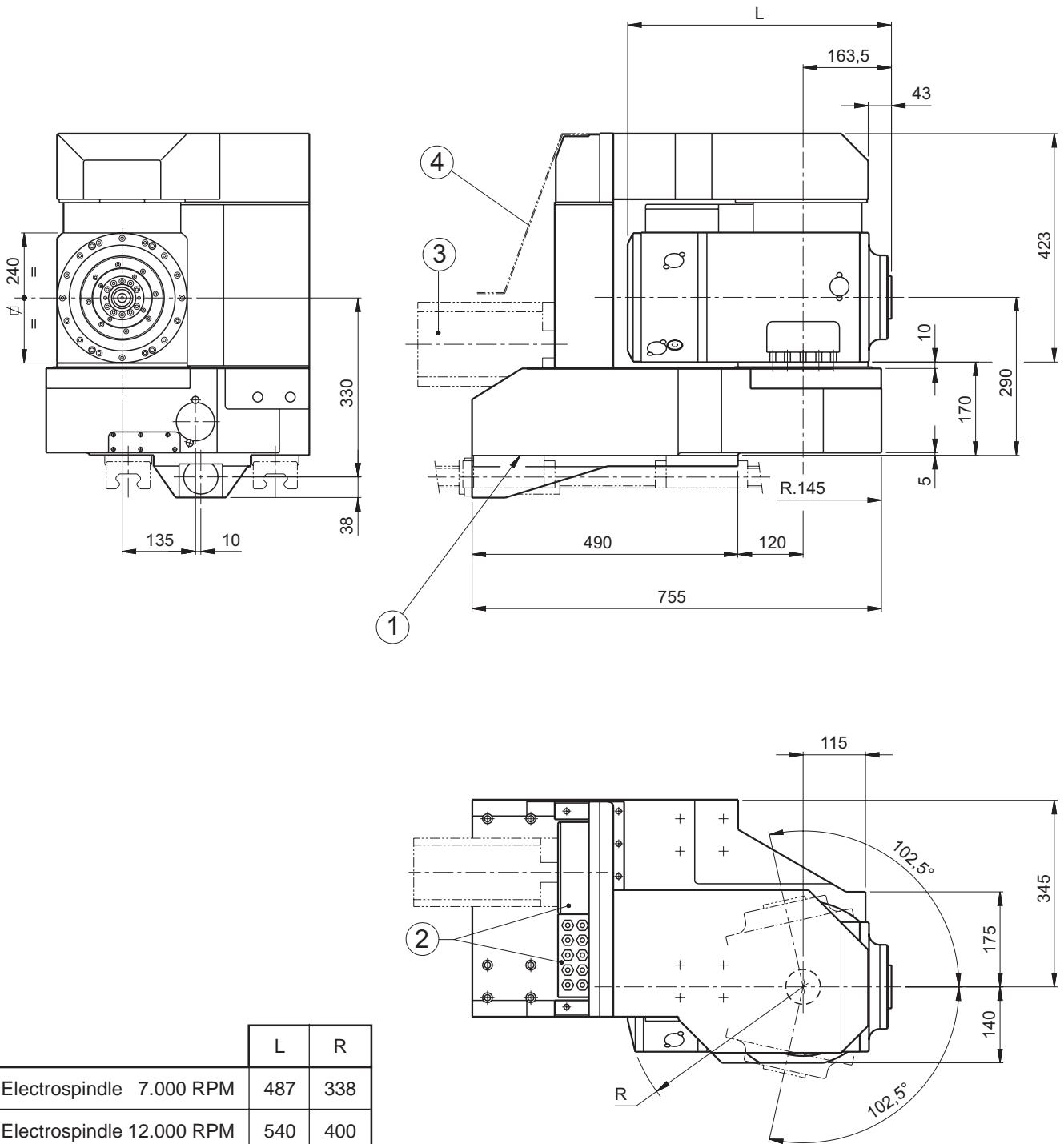


MACHINING CENTER APPLICATION

C) “FLAT” VERSION



ES-B20 "B" AXIS WITH ELECTROSPINDLE OVERALL DIMENSIONS ("A" INTEGRATED AXIS VERSION)



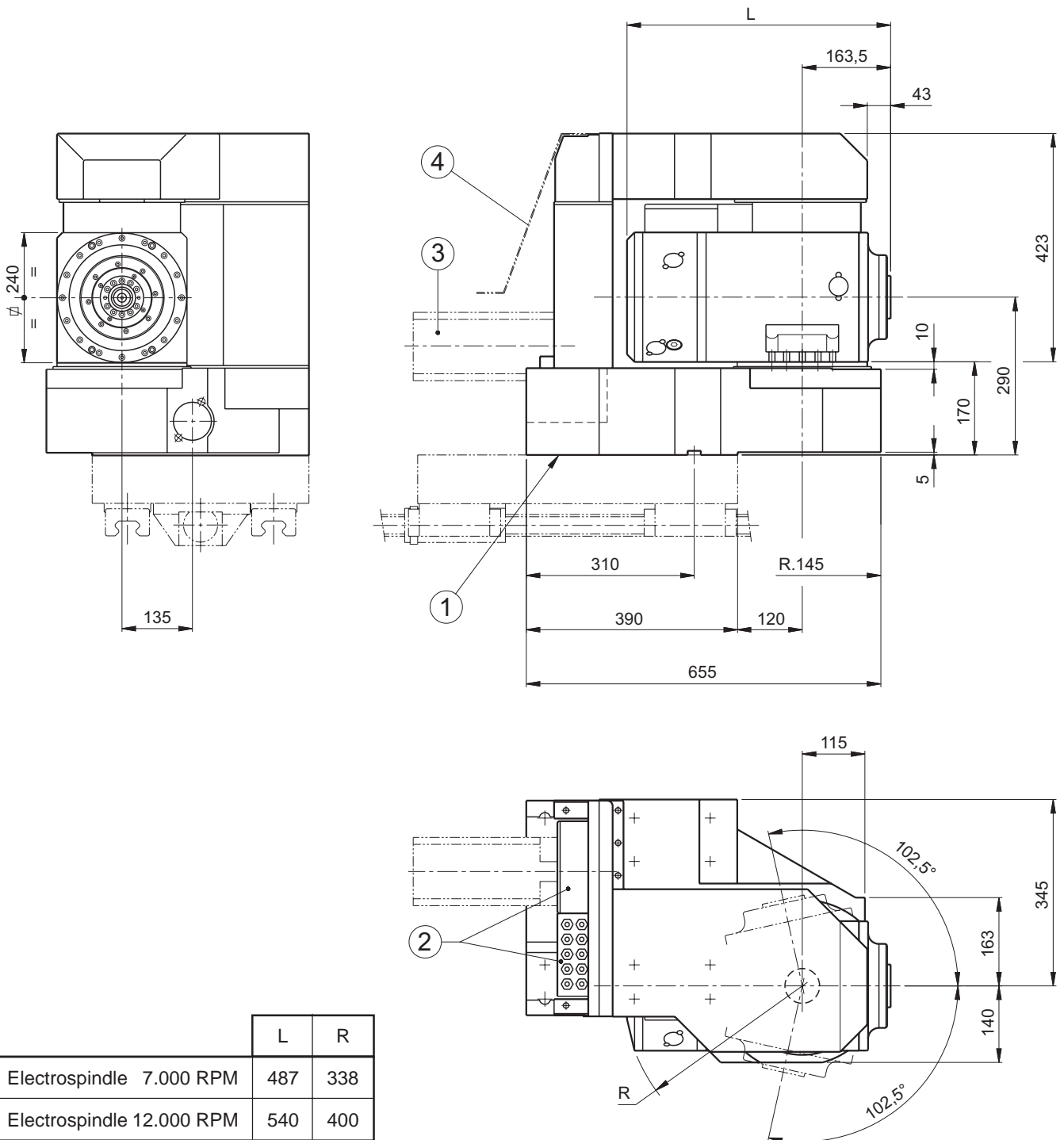
| | L | R |
|---------------------------|-----|-----|
| Electrospindle 7.000 RPM | 487 | 338 |
| Electrospindle 12.000 RPM | 540 | 400 |

For specs see sheets 5 ÷ 7.

NOTES:

- (1) Base design to be defined according to the machine configuration.
- (2) Electrical, hydraulic, pneumatic and coolant connections area.
- (3) "B - Axis" servomotor, excluded.
- (4) Customer protection cover, excluded.

ES-B20 "B" AXIS WITH ELECTROSPINDLE OVERALL DIMENSIONS ("B" FLAT VERSION)



| | L | R |
|---------------------------|-----|-----|
| Electrospindle 7.000 RPM | 487 | 338 |
| Electrospindle 12.000 RPM | 540 | 400 |

For specs see sheets 5 ÷ 7.

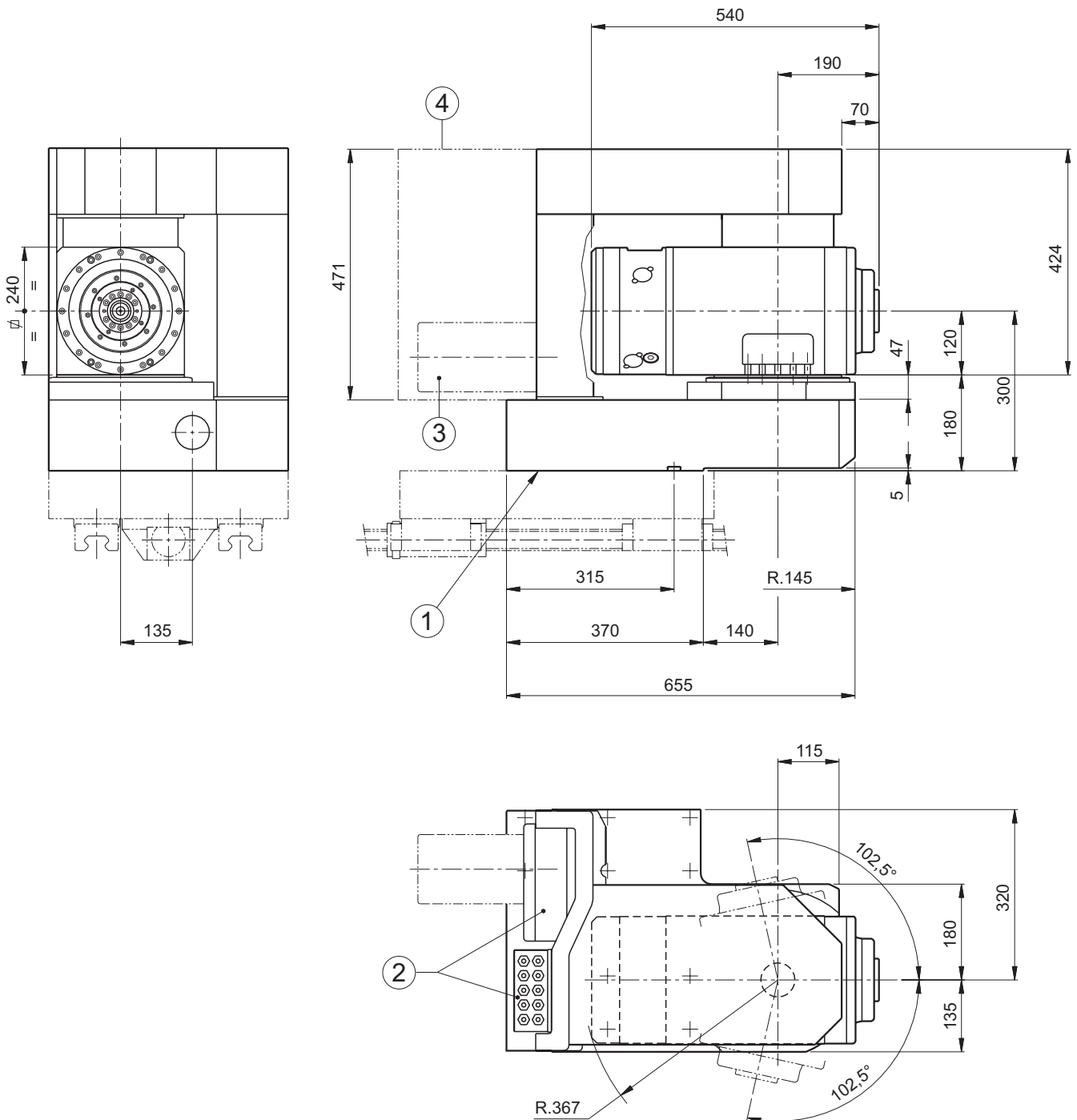
NOTES:

- (1) Base design to be defined according to the machine configuration.
- (2) Electrical, hydraulic, pneumatic and coolant connections area.
- (3) "B - Axis" servomotor, excluded.
- (4) Customer protection cover, excluded.

ES-B20 "B" AXIS WITH ELECTROSPINDLE

OVERALL DIMENSIONS

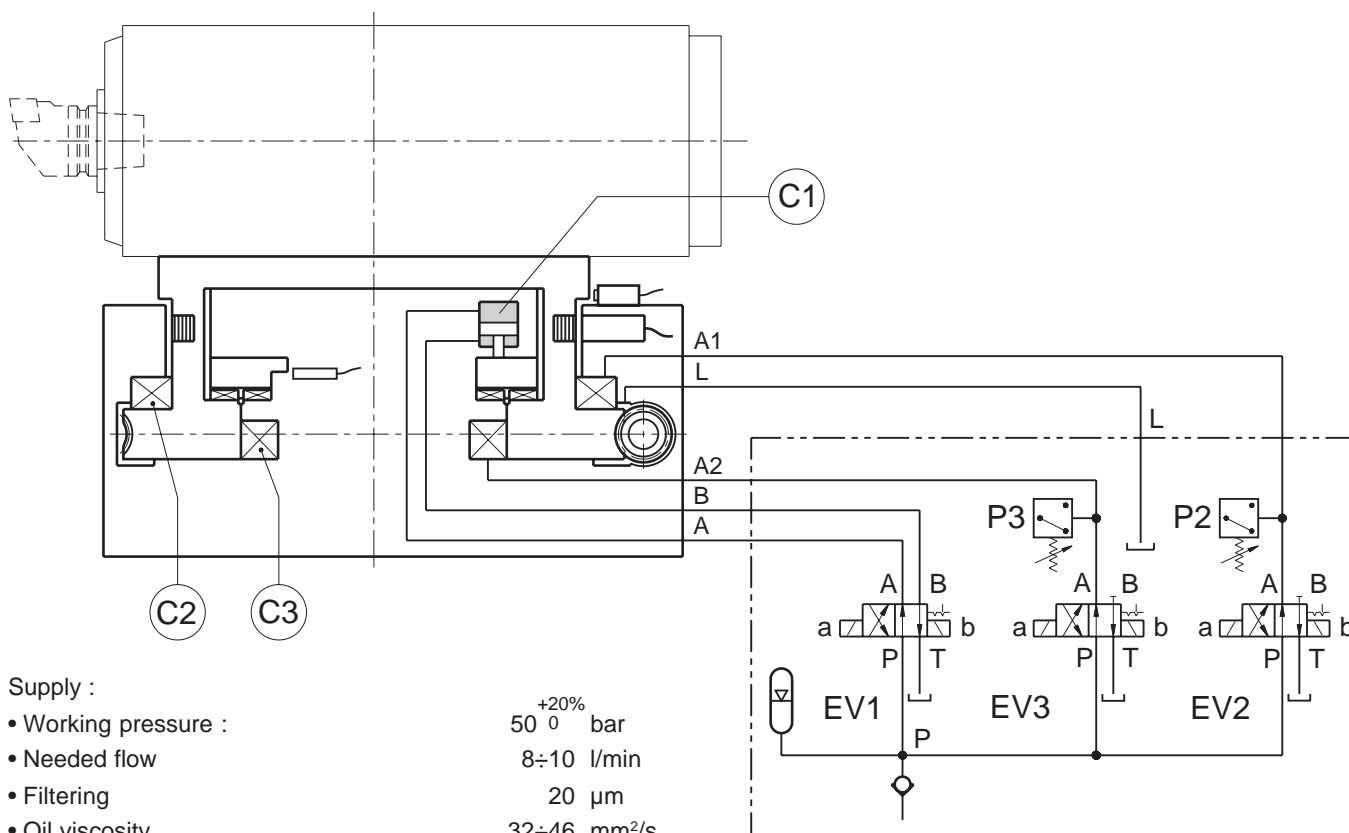
("C" FLAT VERSION with Electerspindle 12.000 RPM)



NOTES:

- (1) Base design to be defined according to the machine configuration.
- (2) Electrical, hydraulic, pneumatic and coolant connections area.
- (3) "B - Axis" servomotor, excluded.
- (4) Customer protection cover, excluded.

ES-B20 TABLE HYDRAULIC DIAGRAM



Supply :

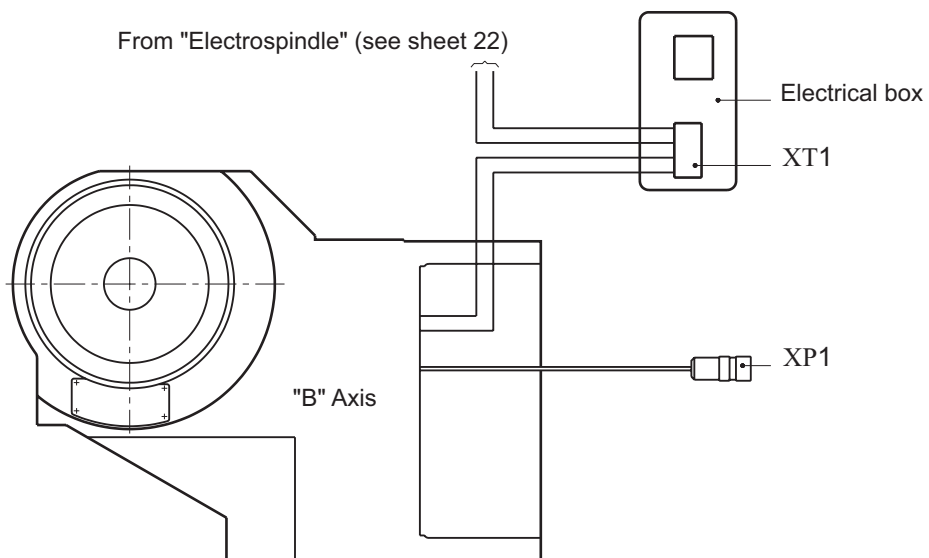
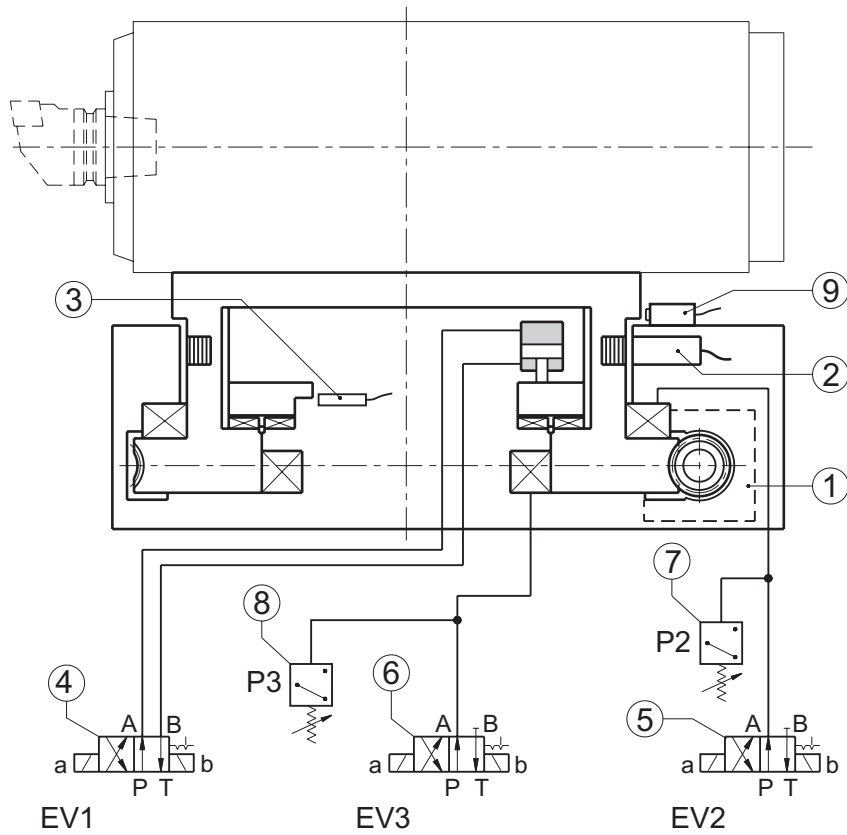
- Working pressure : $50 \begin{smallmatrix} +20\% \\ 0 \end{smallmatrix}$ bar
- Needed flow $8 \div 10$ l/min
- Filtering $20 \mu\text{m}$
- Oil viscosity $32 \div 46 \text{ mm}^2/\text{s}$
- Recommended oil temperature $35 \div 55 \text{ }^\circ\text{C}$
- P2 pressure switch setting ≤ 20 bar
- P3 pressure switch setting $50 \div 70$ bar

| Functions | EV1 | | EV2 | | EV3 | |
|-----------------------------------|--------|--------|--------|--------|--------|--------|
| | sol. a | sol. b | sol. a | sol. b | sol. a | sol. b |
| Index clamping (every 5°) | - | + | - | + | + | - |
| Brake clamping (in any positions) | + | - | - | + | + | - |
| Unclamping for interpolation | + | - | + | - | - | + |

| GAS connections | | | | Required oil volumes |
|-----------------|------------------------|-------------|------|-------------------------------|
| C1 | Indexing cylinder | clamped A | 3/8" | [cm ³] 24 |
| | | unclamped B | 3/8" | [cm ³] 12 |
| C2 | Brake cylinder | A1 | 3/8" | [cm ³] 5 |
| C3 | Interpolation cylinder | A2 | 3/8" | [cm ³] 3 |
| | Drain | L | 1/8" | - |

Recommended nominal dimensions
for hydraulic lines :
DN 10 for L ≤ 6 m
DN 12 for L > 6 m.



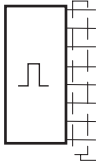
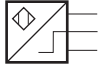
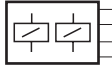
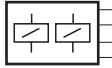
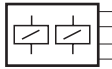

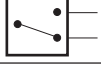


ES-B20 TABLE WIRING DIAGRAM



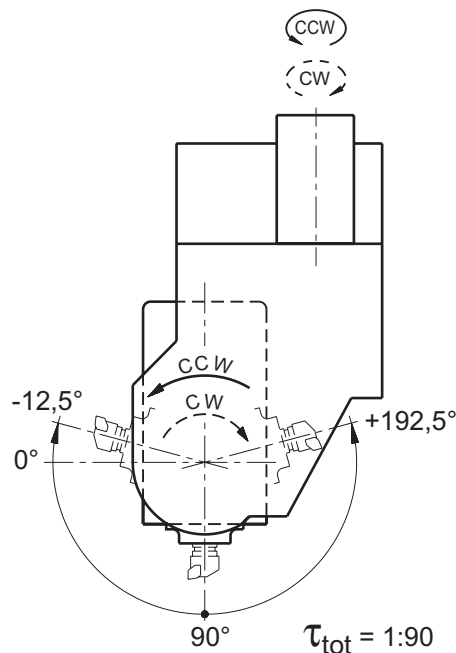
ELECTRICAL BOX :

XT1 - Signals connection terminal board.
XP1 - Angular position transducer connector.

ES-B20 TABLE WIRING DIAGRAM

| REF. | COMPONENT | CHARACTERISTICS | SYMBOL | SIGNALS |
|------|---|--|---|---|
| ① | SERVOMOTOR | See data sheet of select motor |  | |
| | INCREMENTAL PULSE CODER | |  | |
| ② | ANGULAR POSITION TRANSDUCER (INCREMENTAL) | UB = +5V ± 5% SIN-COS 1V PP 512 ppr 17-poles coupling (interconnection) |  | UA+ UA- UR+ GND 5V+Ubb UB+ UB- UR- GND 5V SENSE Shielding |
| ③ | CLAMPING SWITCH | 24V D. C. ± 10% 200 mA (load) OUTPUT-PNP-NO |  | + 24 V SIGNAL 0 V |
| ④ | ELECTROVALVE EV1 | See data sheet of select valve |  | a+ COMMON b+ COMMON |
| ⑤ | ELECTROVALVE EV2 | |  | a+ COMMON b+ COMMON |
| ⑥ | ELECTROVALVE EV3 | |  | a+ COMMON b+ COMMON |
| ⑦ | PRESSURE SWITCH "P2" | See data sheet of select component |  | NO COMMON |
| ⑧ | PRESSURE SWITCH "P3" | |  | NO COMMON |
| ⑨ | DIRECTION SWITCH | 24V D. C. ± 10% 200 mA (load) OUTPUT-PNP-NO |  | + 24 V SIGNAL 0 V |
| | | |  | PE |

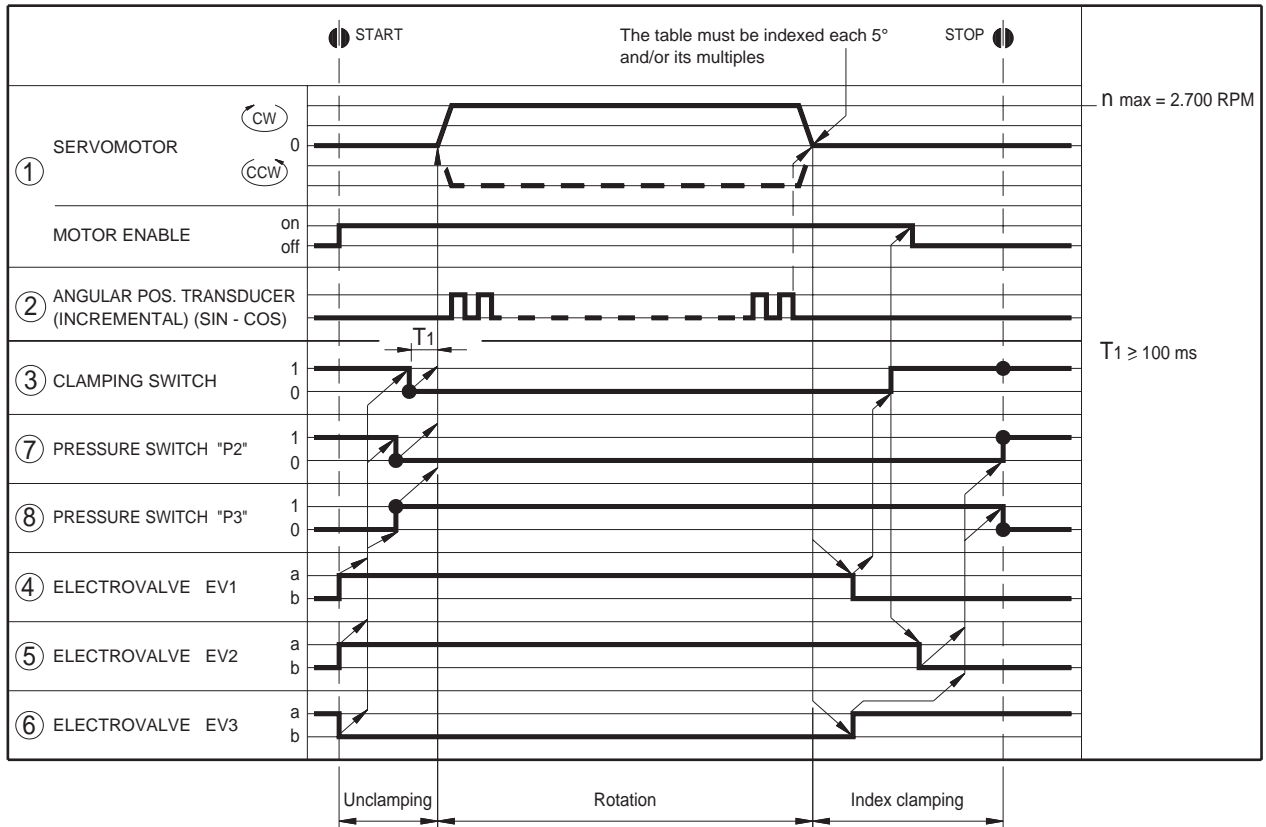
WORKING RANGE



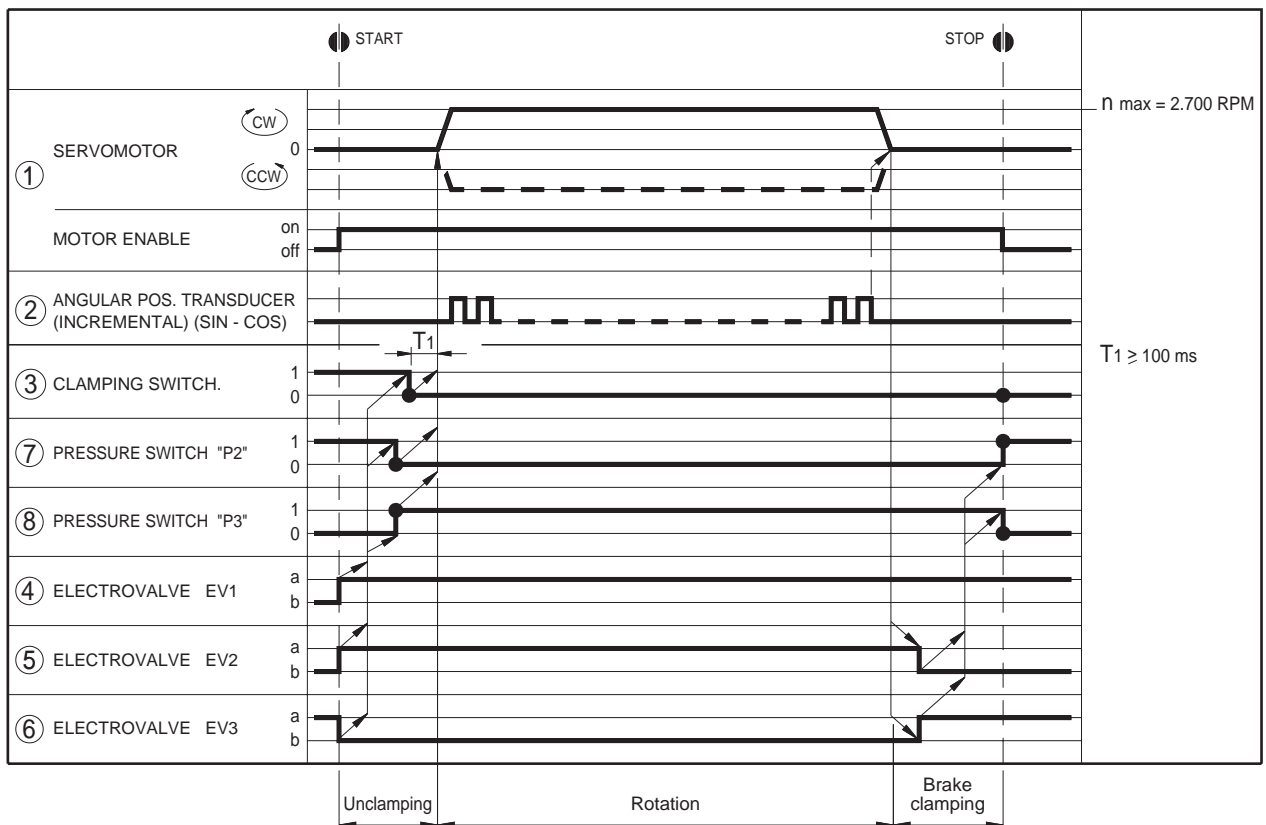
NOTE :
The "zero reference marker" of transducer (2) is set on the mechanical 0° pos.

ES-B20 TABLE CYCLES

A "B" AXIS POSITIONING CYCLE WITH INDEX CLAMPING

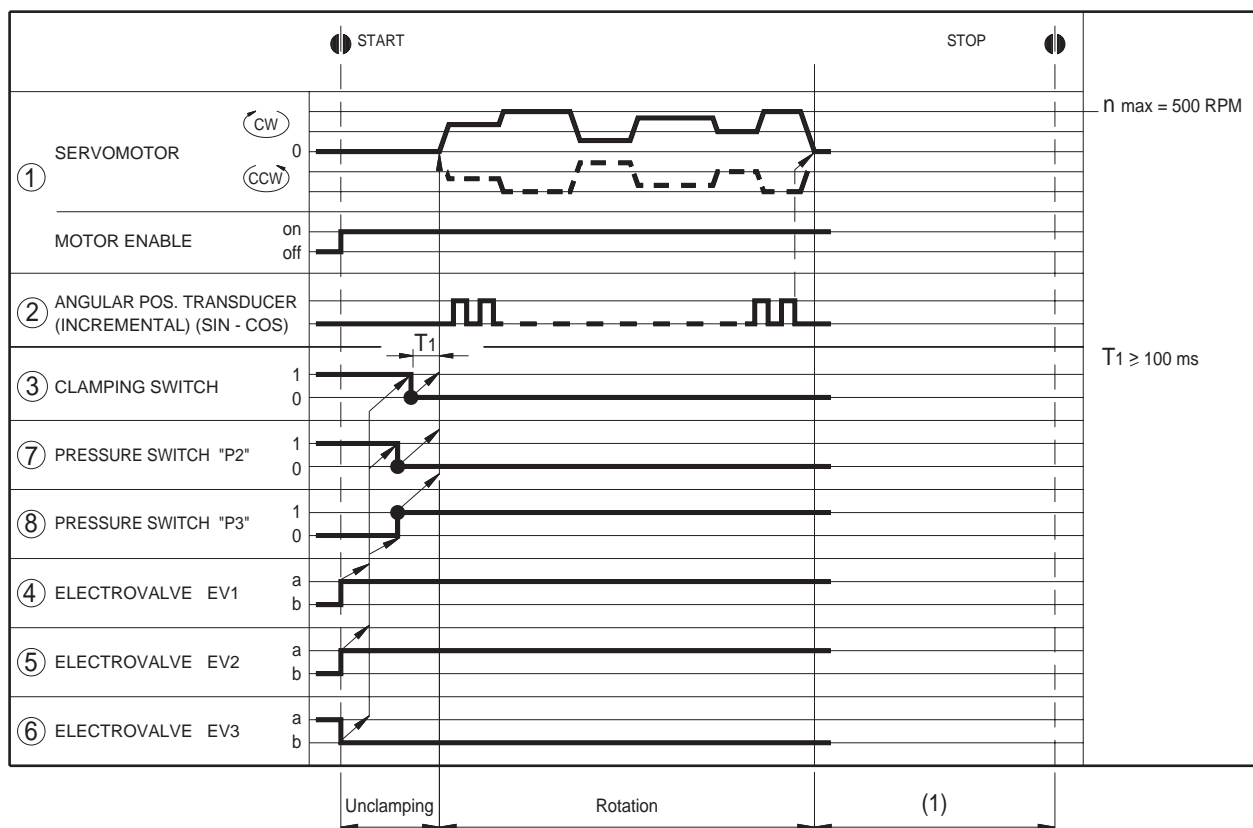


B "B" AXIS POSITIONING CYCLE WITH BRAKE CLAMPING



ES-B20 TABLE CYCLES

Ⓒ “B” AXIS INTERPOLATION MOVEMENT CYCLE (CONTINUOUS ROTATION).

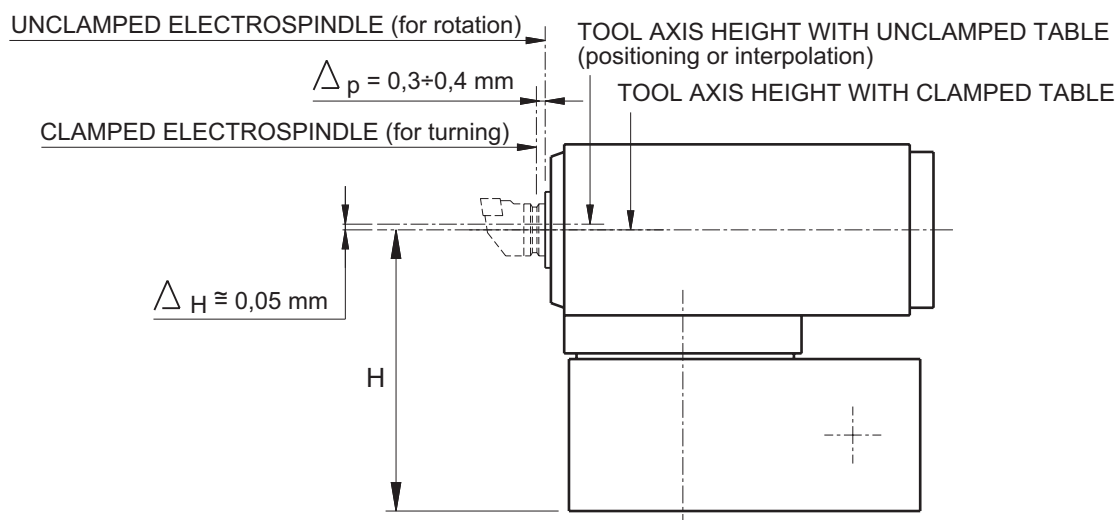


(1) At the end of the interpolation cycle, you can to :

- An index clamping (see relevant phase in cycle Ⓐ).
- An brake clamping (see relevant phase in cycle Ⓑ).

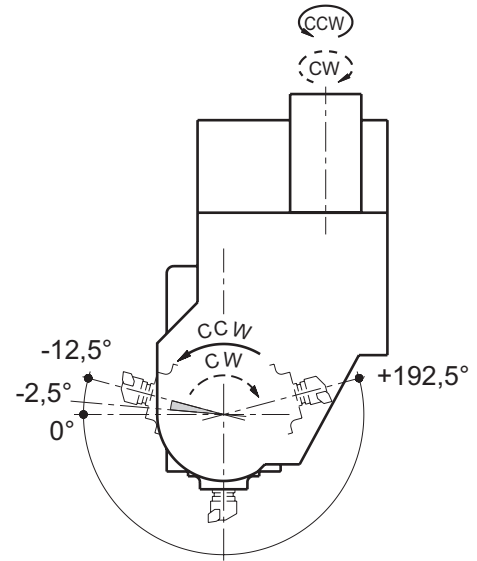
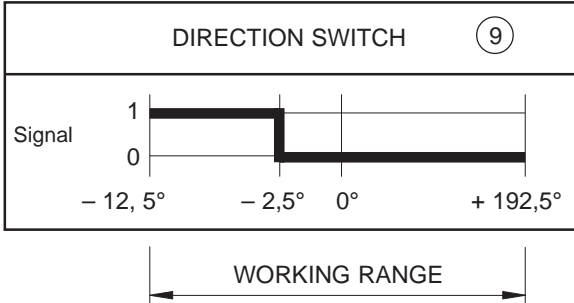
• TOOL FACE POSITION AND AXIS HEIGHT :

- The tool face position is related to the : **Electrospindle clamp / unclamp** conditions.
- The tool axis height is related to the : **Table clamp / unclamp** conditions.

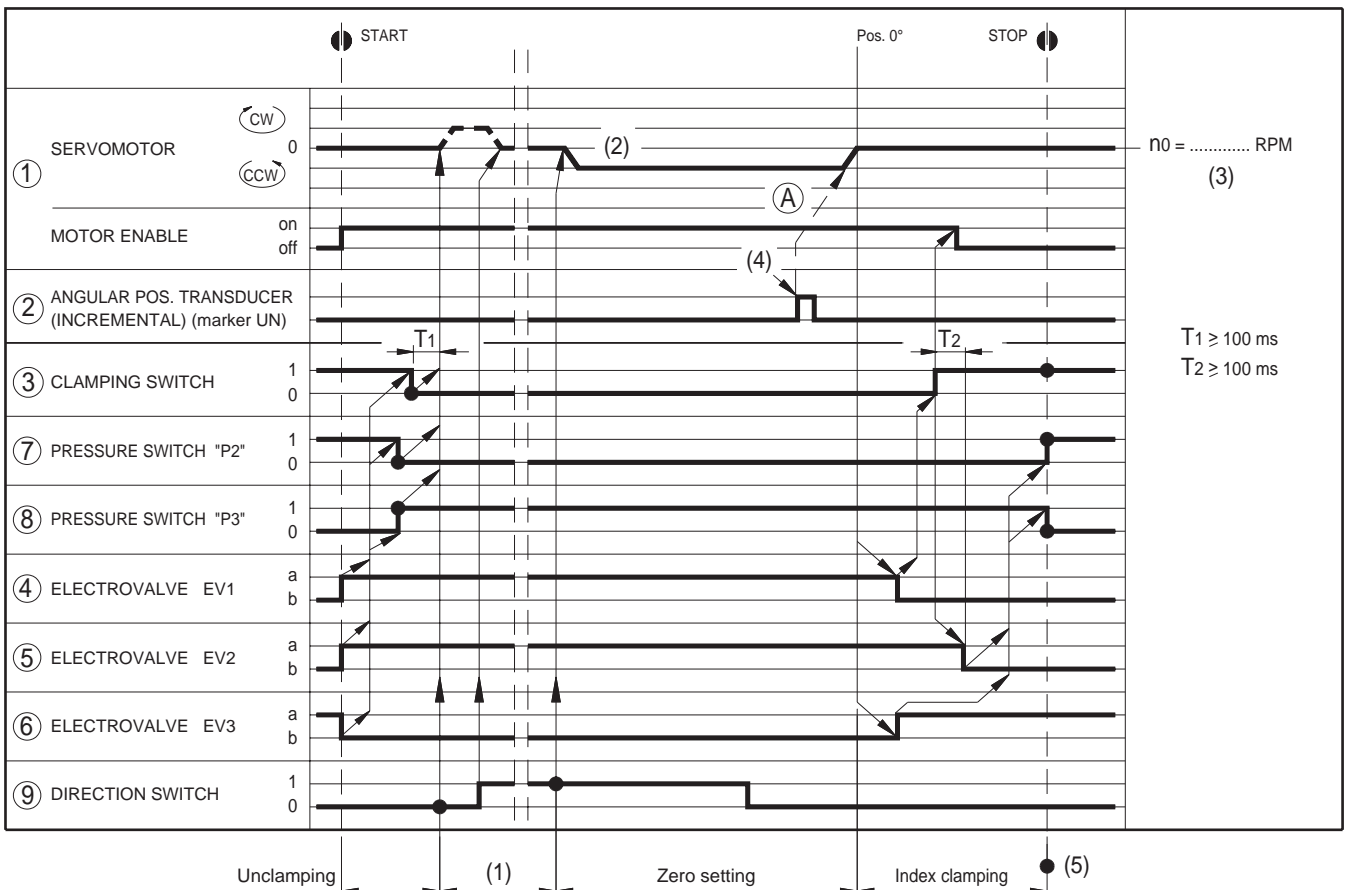


ES-B20 TABLE ZERO CYCLE

• WORKING RANGE AND DIRECTION SWITCH



• CYCLE

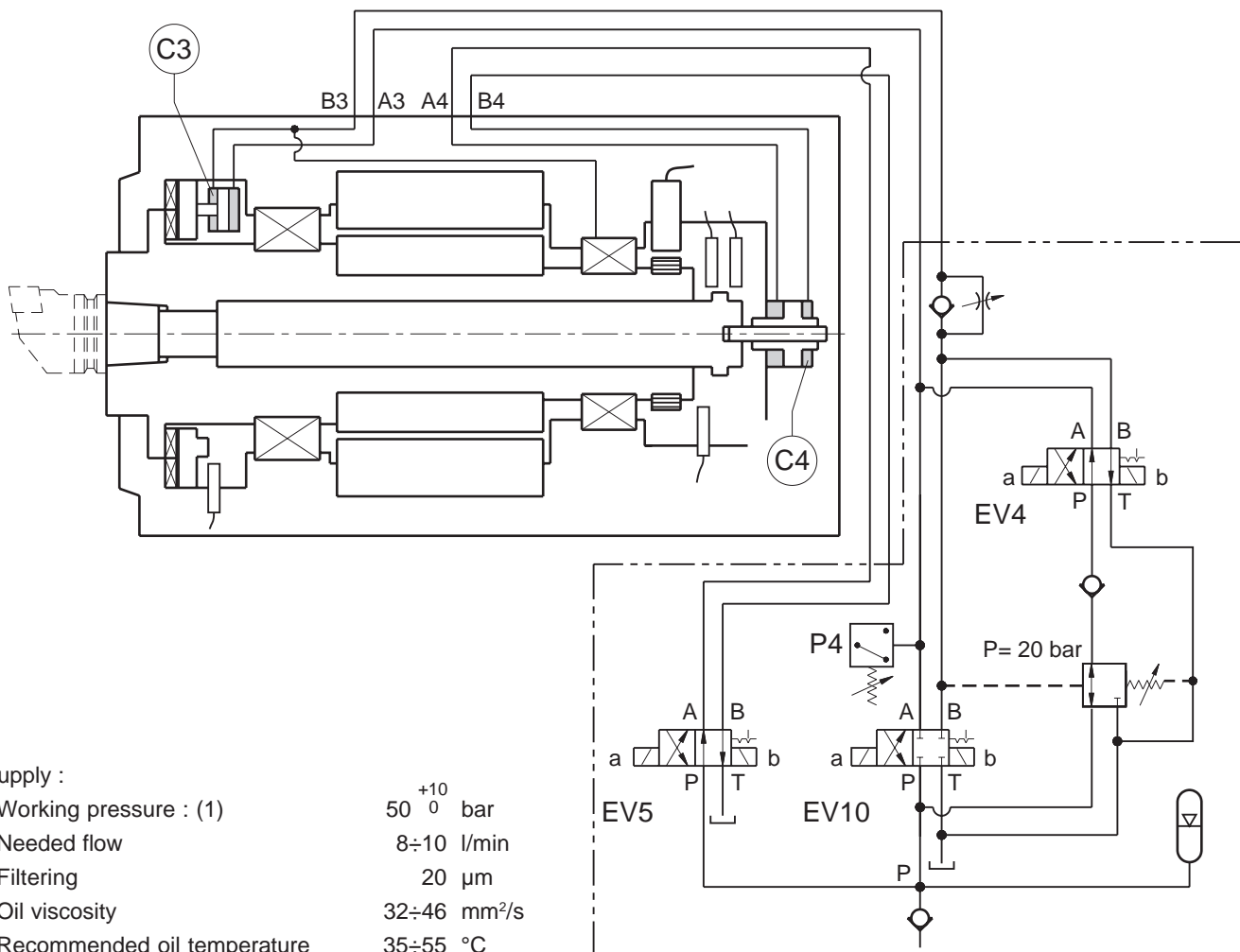


(A) The distance between the transducer marker and the table zero position, must be set.

NOTES:

- (1) Direction switch signal research.
- (2) The transducer marker must be reach with table rotation in **CCW** direction.
- (3) The motor speed for table zero setting must be according to CN /driver specs.
- (4) The zero position stop depends on the "orientation function" of CN.
- (5) The "real zero quote" must be read, after the index clamping.

ES 20 ELECTROSPINDLE HYDRAULIC DIAGRAM



- Supply :
- Working pressure : (1) $50 \begin{smallmatrix} +10 \\ 0 \end{smallmatrix}$ bar
 - Needed flow $8 \div 10$ l/min
 - Filtering $20 \mu\text{m}$
 - Oil viscosity $32 \div 46 \text{ mm}^2/\text{s}$
 - Recommended oil temperature $35 \div 55 \text{ }^\circ\text{C}$

(1) For tool clamping / unclamping $P_{\text{max}} = 70$ bar

| Functions | EV4 | | EV5 | | EV10 | |
|---|--------|--------|--------|--------|--------|--------|
| | sol. a | sol. b | sol. a | sol. b | sol. a | sol. b |
| Spindle index clamping (every 45°) | - | + | | | - | + |
| Spindle unclamping | + | - | | | | |
| Tool clamping | | | - | + | | |
| Tool unclamping | | | + | - | | |
| Pre-load LEVEL 1 (with unclamped spindle) | + | - | | | - | + |
| Pre-load LEVEL 2 (with unclamped spindle) (2) | + | - | | | + | - |

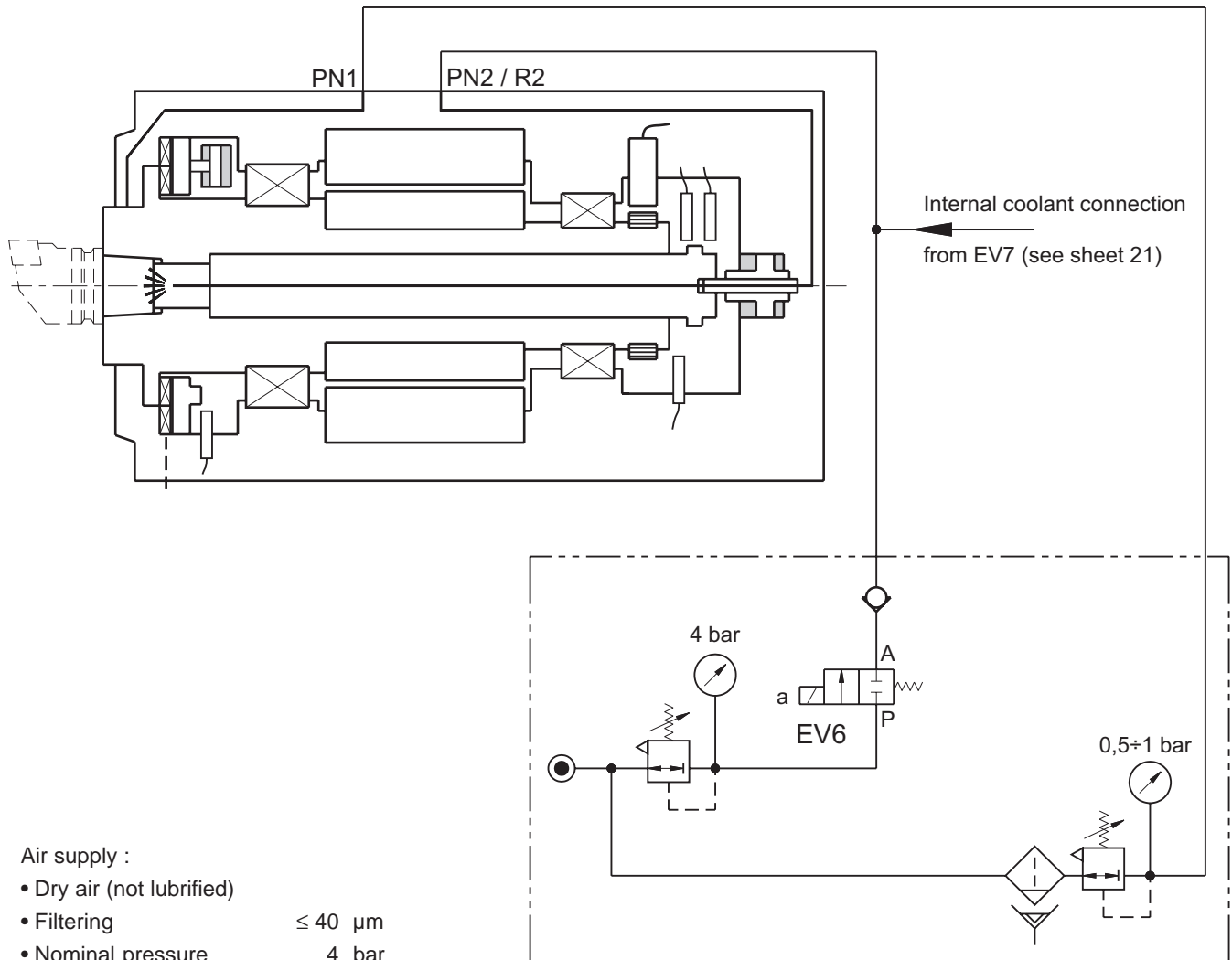
(2) Use the pre-load "LEVEL 2" for heavy duty operations and speed ≤ 1.500 RPM only.

| GAS connections | | Required oil volumes | |
|-----------------|-------------------------------|----------------------|---|
| C3 | Spindle indexing cylinder | clamped A3 | $\frac{1}{4}$ " [cm ³] 18 |
| | | unclamped B3 | $\frac{1}{4}$ " [cm ³] 4 |
| C4 | Tool clamp / unclamp cylinder | clamped A4 | $\frac{1}{4}$ " [cm ³] 77 |
| | | unclamped B4 | $\frac{1}{4}$ " [cm ³] 77 |

Recommended nominal dimensions for hydraulic lines :

- DN 8** for $L \leq 6$ m
- DN 10** for $L > 6$ m.

ES 20 ELECTROSPINDLE PNEUMATIC DIAGRAM



Air supply :

- Dry air (not lubricated)
- Filtering $\leq 40 \mu\text{m}$
- Nominal pressure 4 bar

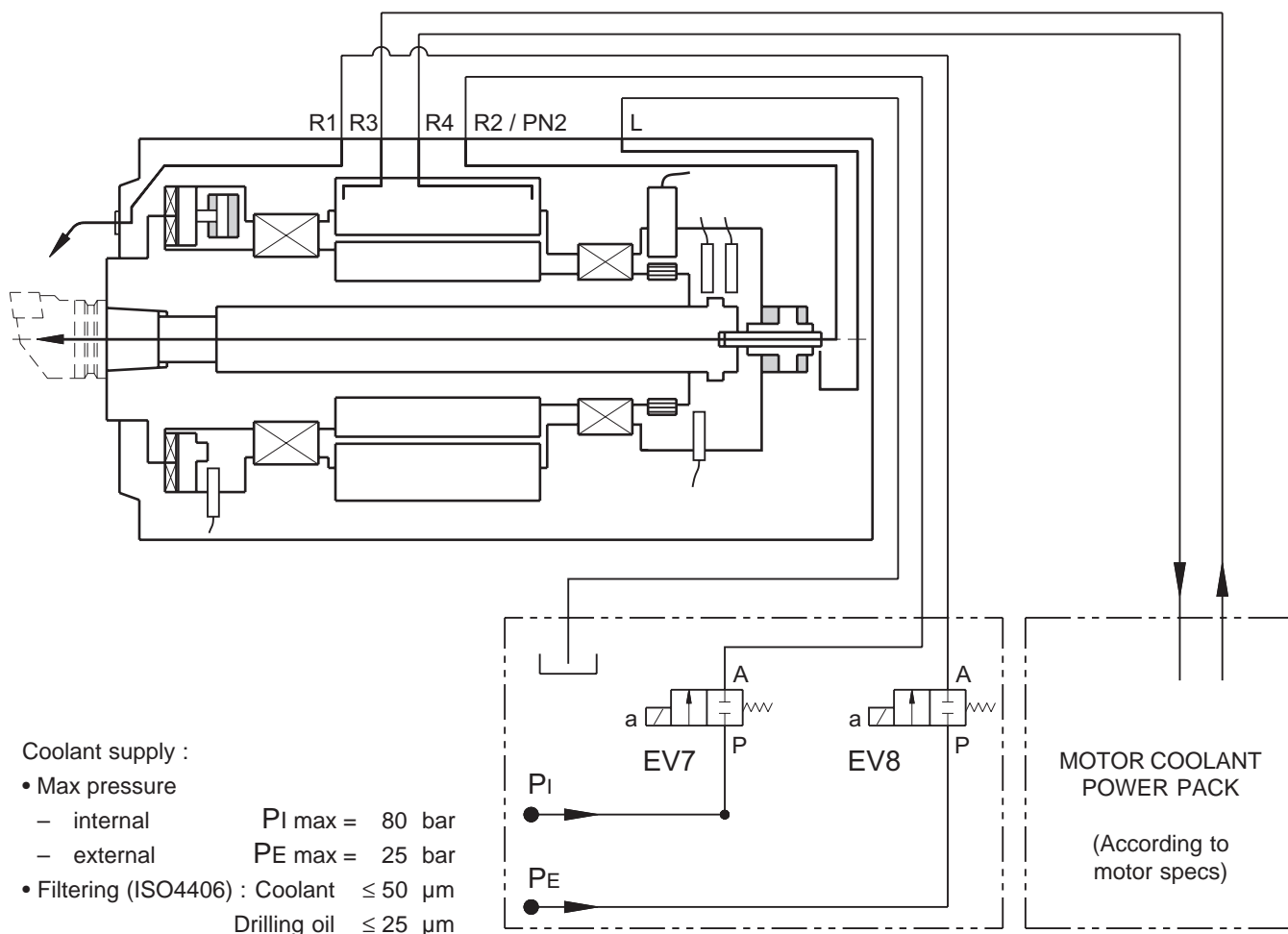
| Function | EV6 sol. a |
|--------------|---------------|
| No air | - |
| Cleaning air | + |

| "GAS" Connections | | |
|--------------------------|----------|------|
| Internal pressurization | PN1 | 1/8" |
| Tool change cleaning (1) | R2 / PN2 | 1/4" |

(1) It is same line also for R2 internal coolant see sheet 21.

ES 20 ELECTROSPINDLE

MOTOR COOLING AND TOOL COOLANT DIAGRAM

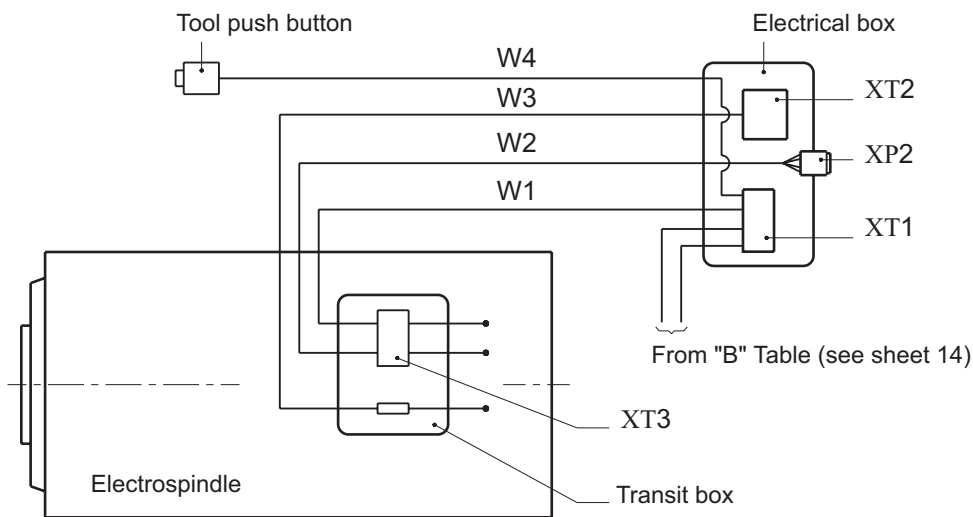
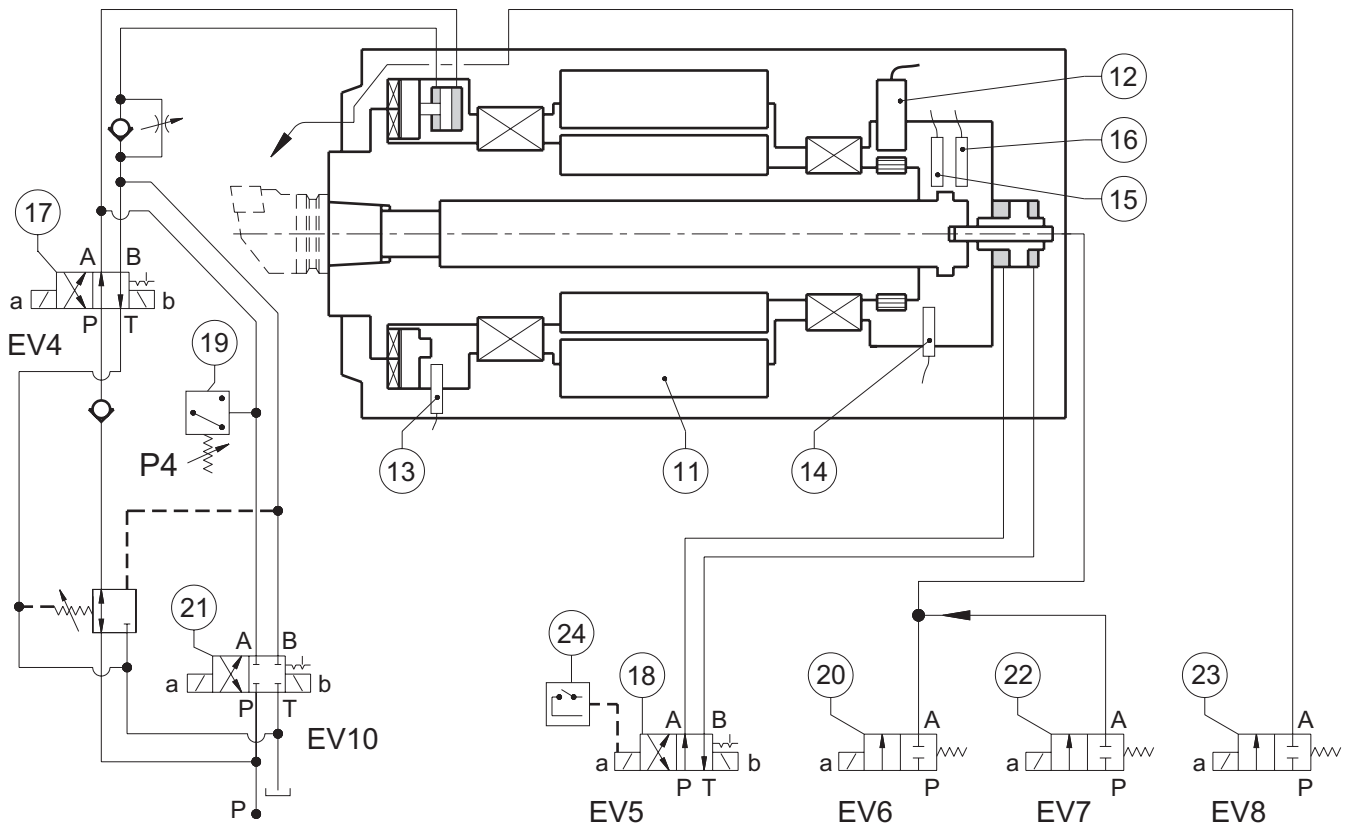


| Functions | EV7 sol. a | EV8 sol. a |
|---------------------|---------------|---------------|
| No internal coolant | - | |
| Internal coolant | + | |
| No external coolant | | - |
| External coolant | | + |

| "GAS" Connections | | |
|-----------------------------|-------------|------|
| External coolant | R1 | 1/4" |
| Internal coolant | R2 / PN2 | 1/4" |
| Motor cooling | Inlet - R3 | 1/4" |
| | Outlet - R4 | 1/4" |
| Rotating distribution drain | L | 1/4" |

(1) It is same line also for PN2 pneumatic connections see sheet 20.

ES 20 ELECTROSPINDLE WIRING DIAGRAM



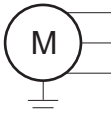

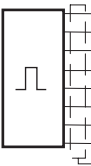




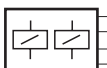
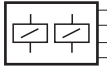


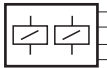



ELECTRICAL BOX :

- XT1 - Signals connection terminal board.
- XT2 - Motor power connection terminal board.
- XT3 - Signals terminal board (switches and angular position transducer).
- XP2 - Angular position transducer connector.

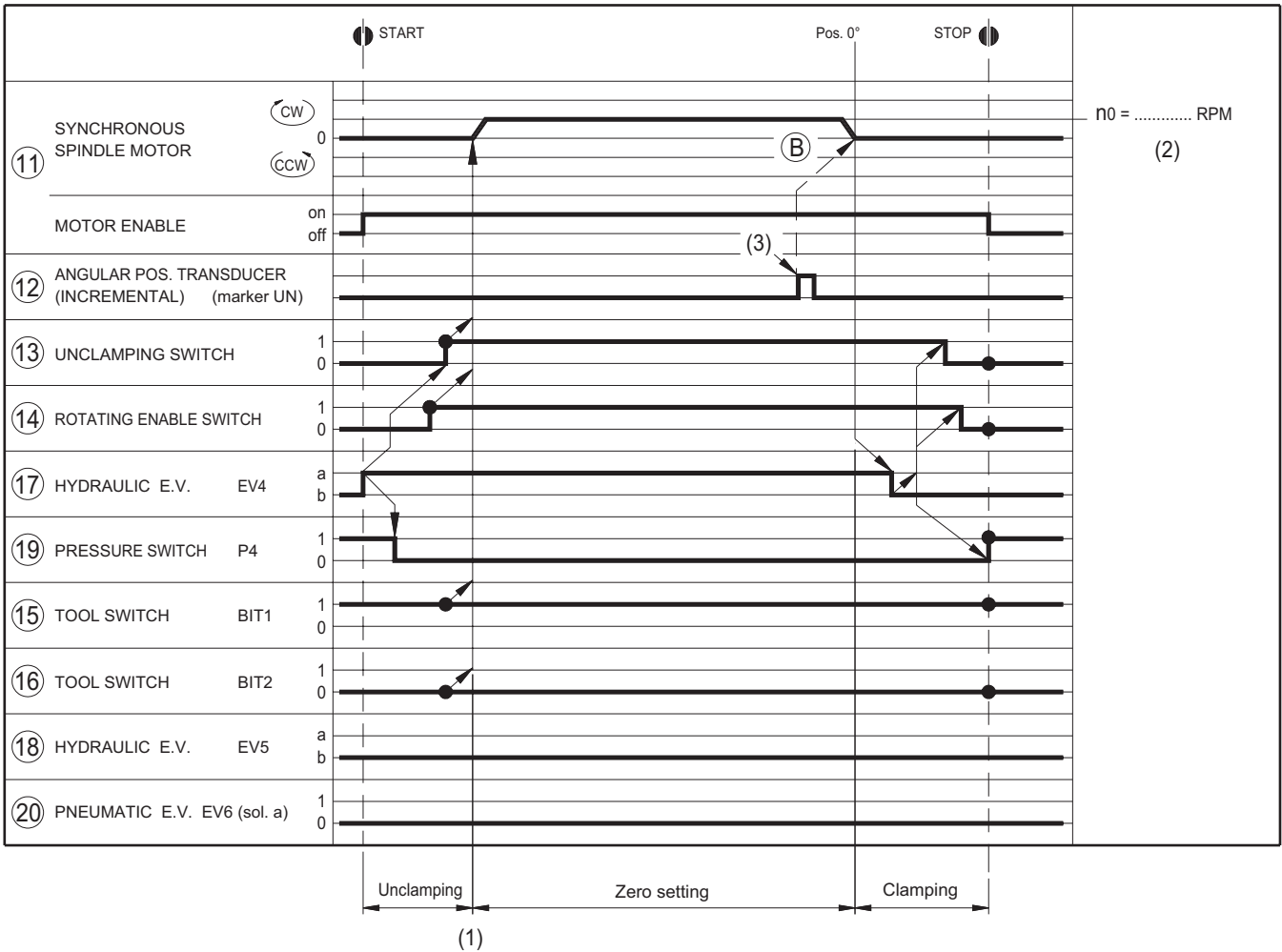
CABLES :

- W1 - Switches signals.
- W2 - Angular position transducer.
- W3 - Motor power.
- W4 - Push button.

ES 20 ELECTROSPINDLE WIRING DIAGRAM

| REF. | COMPONENT | CHARACTERISTICS | SYMBOL | SIGNALS |
|------|--|---|--|--|
| 11a | Synchronous spindle motor | See technical data (sheet 6 and 7) |  | U V W |
| 11b | KTY 84 - PTC THERMAL DETECTOR | R= 580 Ω (20°C) R= 1.000 Ω (100°C) |  | T1- T1+ |
| 12 | ANGULAR POS. TRANSDUCER (INCREMENTAL) | UB = +5V ± 5% SIN-COS 1V PP 360 ppr |  | UA+ UA- UN+ GND 5V+Ubb UB+ UB- UN- GND 5V SENSE |
| 13 | UNCLAMPING SWITCH | 24V D. C. ± 10% 200 mA (load) OUTPUT-PNP-NO |  | + 24 V SIGNAL 0 V |
| 14 | ROTATING ENABLE SWITCH | |  | + 24 V SIGNAL 0 V |
| 15 | TOOL SWITCH BIT1 | |  | + 24 V SIGNAL 0 V |
| 16 | TOOL SWITCH BIT2 | |  | + 24 V SIGNAL 0 V |
| 17 | HYDRAULIC E.V. EV4 | See data sheet of select valve |  | a+ COMMON b+ COMMON |
| 18 | HYDRAULIC E.V. EV5 | |  | a+ COMMON b+ COMMON |
| 19 | PRESSURE SWITCH "P4" | See data sheet of select component |  | NA COMMON |
| 20 | PNEUMATIC E.V. EV6 | See data sheet of select valve |  | a+ COMMON |
| 21 | HYDRAULIC E.V. EV10 | |  | a+ COMMON b+ COMMON |
| 22 | INTERNAL COOLANT E.V. EV7 | |  | a+ COMMON |
| 23 | EXTERNAL COOLANT E.V. EV8 | |  | a+ COMMON |
| 24 | TOOL PUSH BUTTON | |  | + 24 V SIGNAL |

ES 20 ELECTROSPINDLE ZERO CYCLE



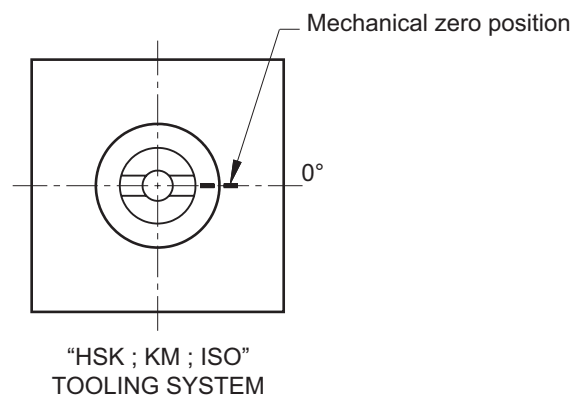
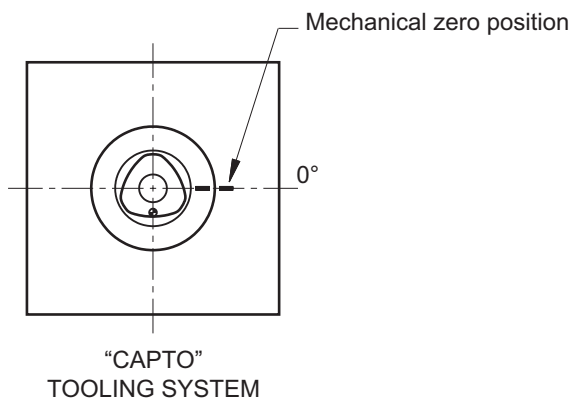
IMPORTANT : When the electrospindle is used, the air pressurization and motor cooling functions must be **ON**.

NOTES: (1) During the “zero cycle” of the electrospindle, the “pre-load” LEVEL2 must be selected
(See sheet 19 - EV10-sol. a).

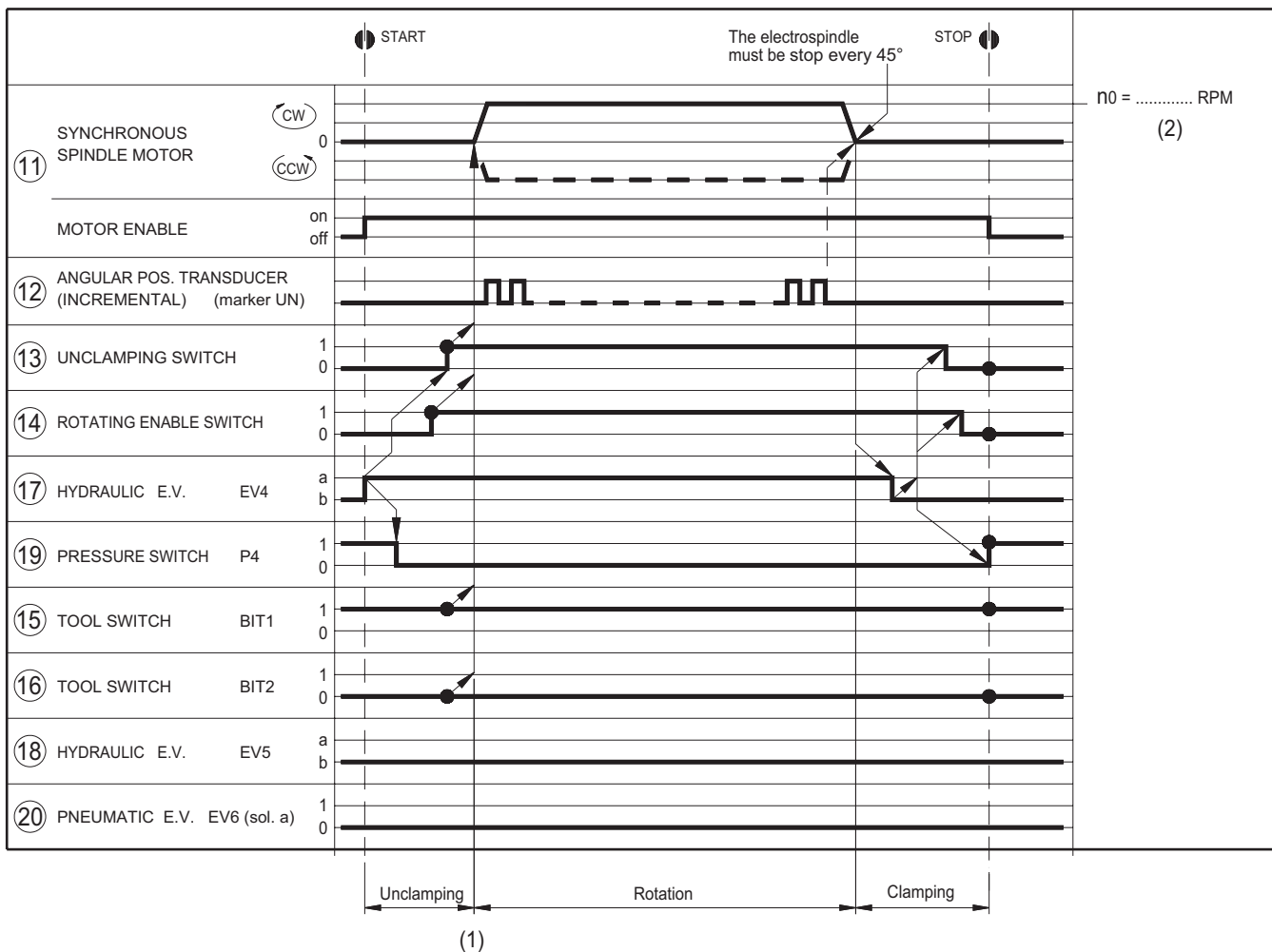
(2) The motor speed for zero setting must be according to CN/ driver specs.

(3) The zero position stop depends on the "orientation function" of CN.

(B) The distance between transducer marker (12) and mechanical zero position, must be set.
The max error between the electrical and mechanical zero position must be 0,1°.



ES 20 ELECTROSPINDLE POSITIONING CYCLE WITH INDEX CLAMPING (STATIC TOOL)



IMPORTANT : When the electrospindle is used, the air pressurization and motor cooling functions must be **ON**.

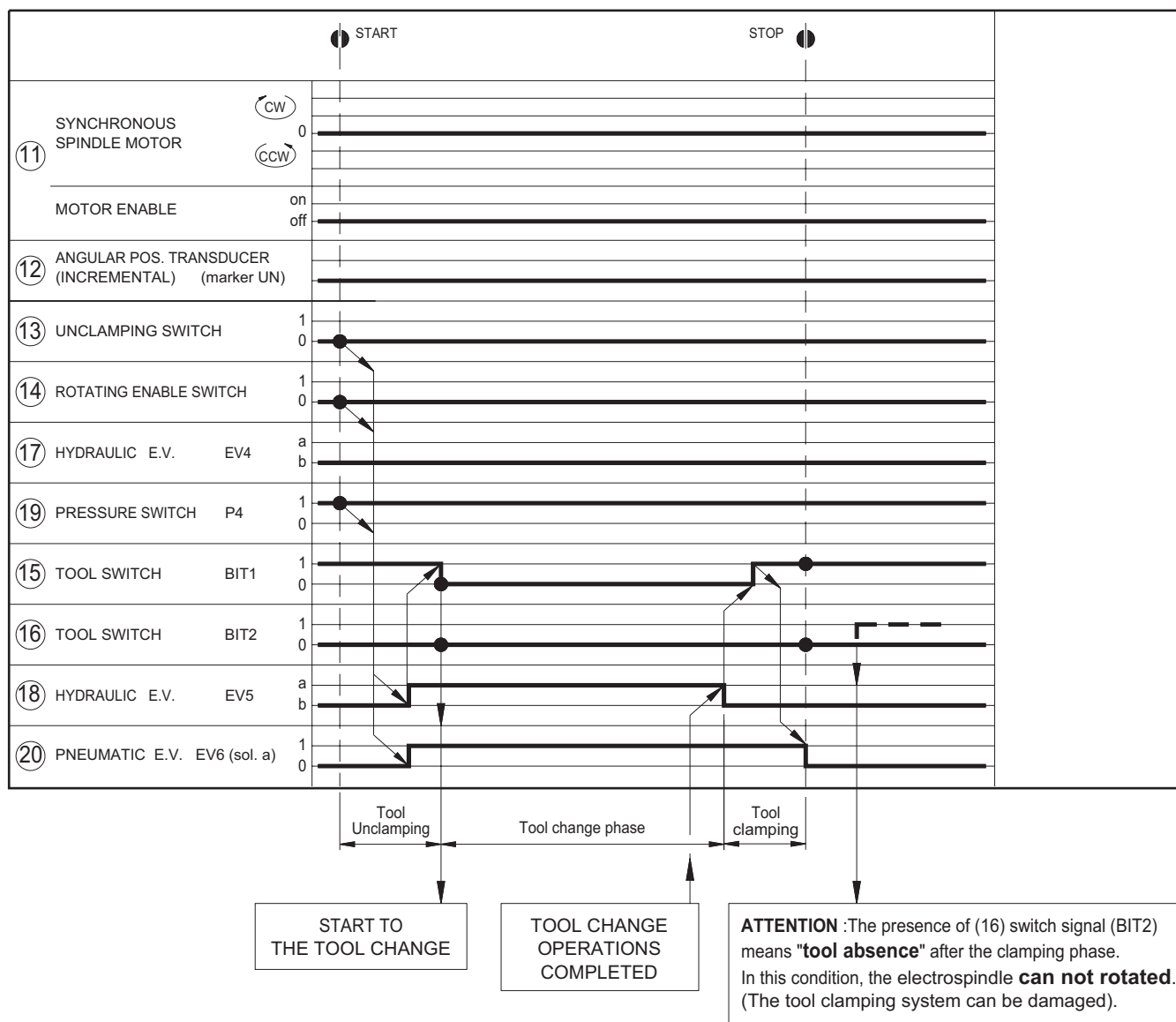
- NOTE:**
- (1) During the "positioning cycle" of the electrospindle, the "pre-load" LEVEL2 must be selected (See sheet 19 - EV10-sol. a).
 - (2) The motor speed for positioning cycle with index clamping must be according to CN/ driver specs.

ES 20 ELECTROSPINDLE TOOL CHANGE CYCLE

• **START** conditions:

- The ES-B table must be indexed in the TOOL CHANGE POSITION.
- The ES electrospindle must be indexed in the TOOL CHANGE POSITION.

• **CYCLE**

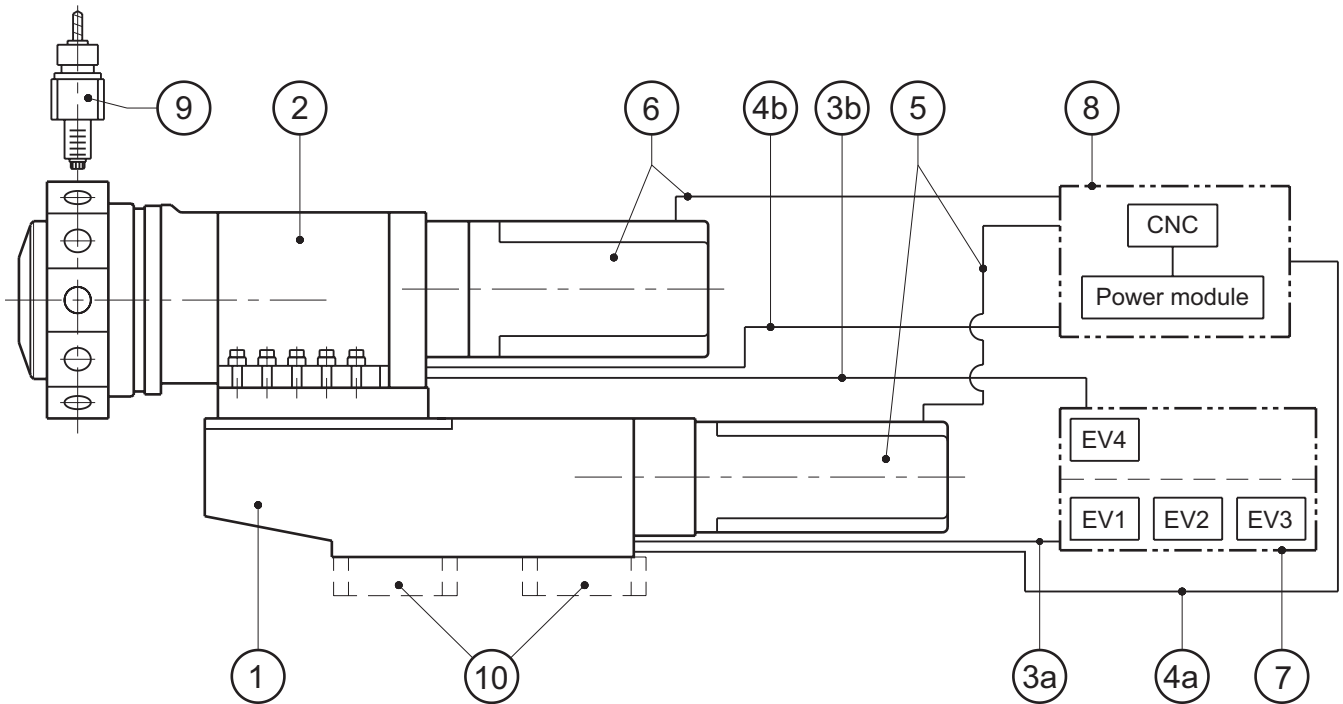


• **Tool switches** (15) and (16)

With this two signals, following conditions are monitored :

| SWITCHES | 15 | 16 |
|-------------------------------|----|----|
| Tool unclamped | 0 | 0 |
| Tool clamped | 1 | 0 |
| Tool absence (after clamping) | 1 | 1 |

RV-B "B" AXIS WITH TURRET SUPPLY COMPOSITION



DIPLOMATICO SUPPLY

- (1) **RV-B16** Table (with interface group for Servomotor).
- (2) **SM-BR16** Turret (with interface group for Servomotor).

EXCLUDED

- (3.a) **RV-B16** Table - Hydraulic pipelines.
- (3.b) **SM-BR16** Turret - Hydraulic pipelines.
- (4.a) **RV-B16** Table - Electrical connections.
- (4.b) **SM-BR16** Turret - Electrical connections.
- (5) Servomotor for table and its electrical connections.
- (6) Servomotor for turret and its electrical connections.
- (7) Hydraulic equipment and power pack.
- (8) Power modules.
- (9) Tool holders.
- (10) Joint components to machine axis.

RV-B “B” AXIS WITH TURRET TECHNICAL DATA

“RV-B” TABLE

| | | |
|---|------------|-----------------------------------|
| Size | | RV-B16 |
| Rotation direction | | Bidirectional |
| Angular stroke : <ul style="list-style-type: none"> with turret SM-BR 16 (front and back-machining) | Deg° | - 5° / +45° |
| Angular position : <ul style="list-style-type: none"> Index clamping Brake clamping | resolution | every 5° 0,001° |
| Operating times : <ul style="list-style-type: none"> Table rotation <ul style="list-style-type: none"> one step index time (including acc. / dec.) 45° step-less rotation time 45° Table unclamping or clamping Table pre-loading for interpolation | s | 0,60 0,25 0,20 0,20 |
| Positioning accuracy (index clamping) | Deg.° | ± 4" |
| Repeatability accuracy (index clamping) | Deg.° | ± 1,5" |
| Positioning accuracy (brake clamping) | Deg.° | ± 8" |
| Transmission ratio : | τ | 1 : 66 |
| Max motor speed : <ul style="list-style-type: none"> positioning interpolating | RPM RPM | 2.000 500 |
| Angular transducer : Incremental pulse coder | | 512 ppr - resolution 0,001° |
| Motor (optional) : (1) SIEMENS | | 1FK 6063 |
| Hydraulic working pressure | bar | 50 ^{+20%} / ₀ |
| Ambient temperature range | ° C | 5 ÷ 40 |

TURRET

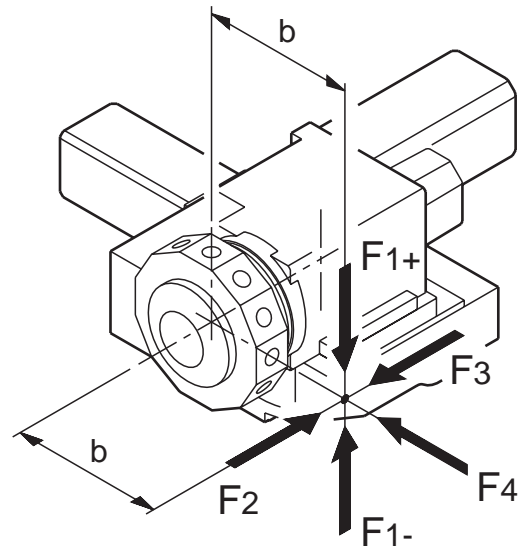
| | |
|---|------------------------------------|
| Type and size | SM-BR 16 |
| N° positions / Tooling system | 12 positions / DIN 69880 - ø30 |
| Machinig operation | Front and back |
| Tool drive : <ul style="list-style-type: none"> Torque S1 S3 - 25% - 10min Max speed Transmission ratio | 20 Nm 32 Nm 5.000 RPM 1:1 |
| Motor (optional) (1) SIEMENS | 1FT 6084 |
| For all others turret technical data see : | I.T. 6445 |

(1) Different motor types, on request.

RV-B16 "B" AXIS WITH TURRET LOADING CAPACITY

TURNING OPERATIONS

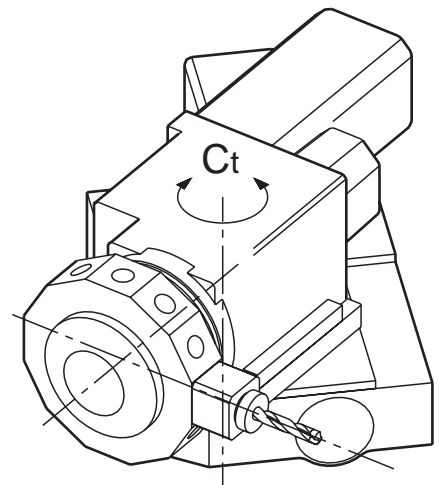
- "RV-B" indexed table



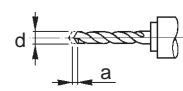
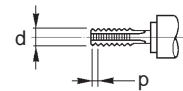
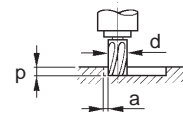
| | | | | |
|------------------------------|----------|----|--------|------------------------------|
| Max tangential torque | (F1 x b) | Nm | 1.800 | F1 = 8.200 N for b = 220 mm |
| Max tilting torque (to push) | (F2 x b) | Nm | 2.500 | F2 = 11.400 N for b = 220 mm |
| Max tilting torque (to lift) | (F3 x b) | Nm | 2.200 | F3 = 10.000 N for b = 220 mm |
| Max radial tilting force | F4 | N | 12.000 | |

ROTATING TOOL OPERATIONS

- Max tangential torque (for the table) :
 - Index clamping $C_t = 2.500 \text{ Nm}$
 - Brake clamping $C_t = 1.000 \text{ Nm}$
 - Interpolation $C_t = 700 \text{ Nm}$

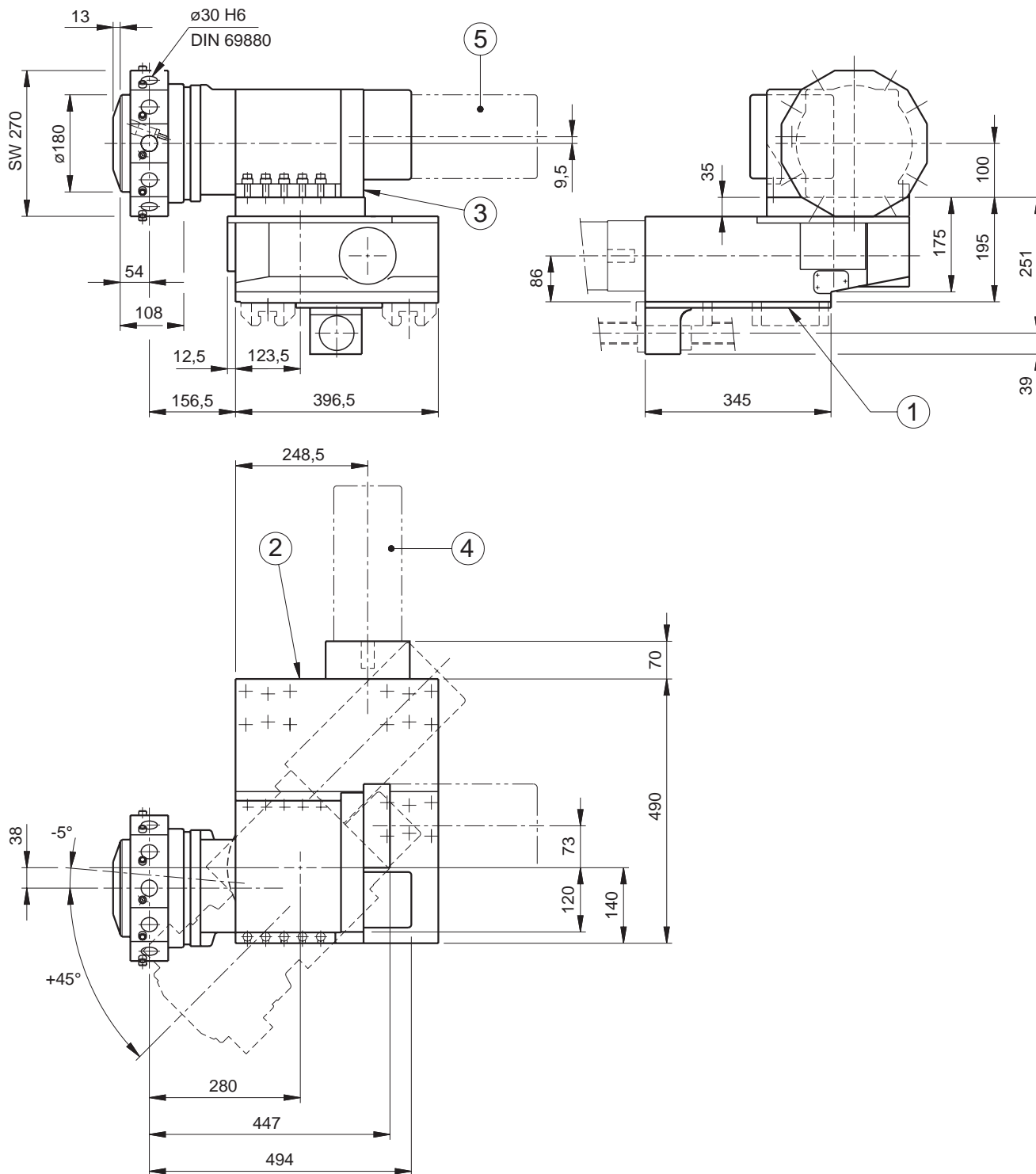


INDICATIVE CUTTING CAPACITY for 600 N/mm² steel.

| | | | | |
|---------------------|---|---|-----------|--|
| DRILLING |  | $d \times a$ [mm] x [mm/u] | HSS tools | $\varnothing 15 \times 0,20$ (520 RPM) $\varnothing 20 \times 0,15$ (400 RPM) |
| TAPPING |  | $d \times p$ [mm] x [mm] | | M 12 x 1,75 M 20 x 1,5 |
| MILLING end mill |  | $d \times p \times a$ [mm] x [mm] x [mm/min] | HSSE mill | 22 x 14 x 40 (480 RPM) |

RV-B16 "B" AXIS WITH SM-BR 16 TURRET

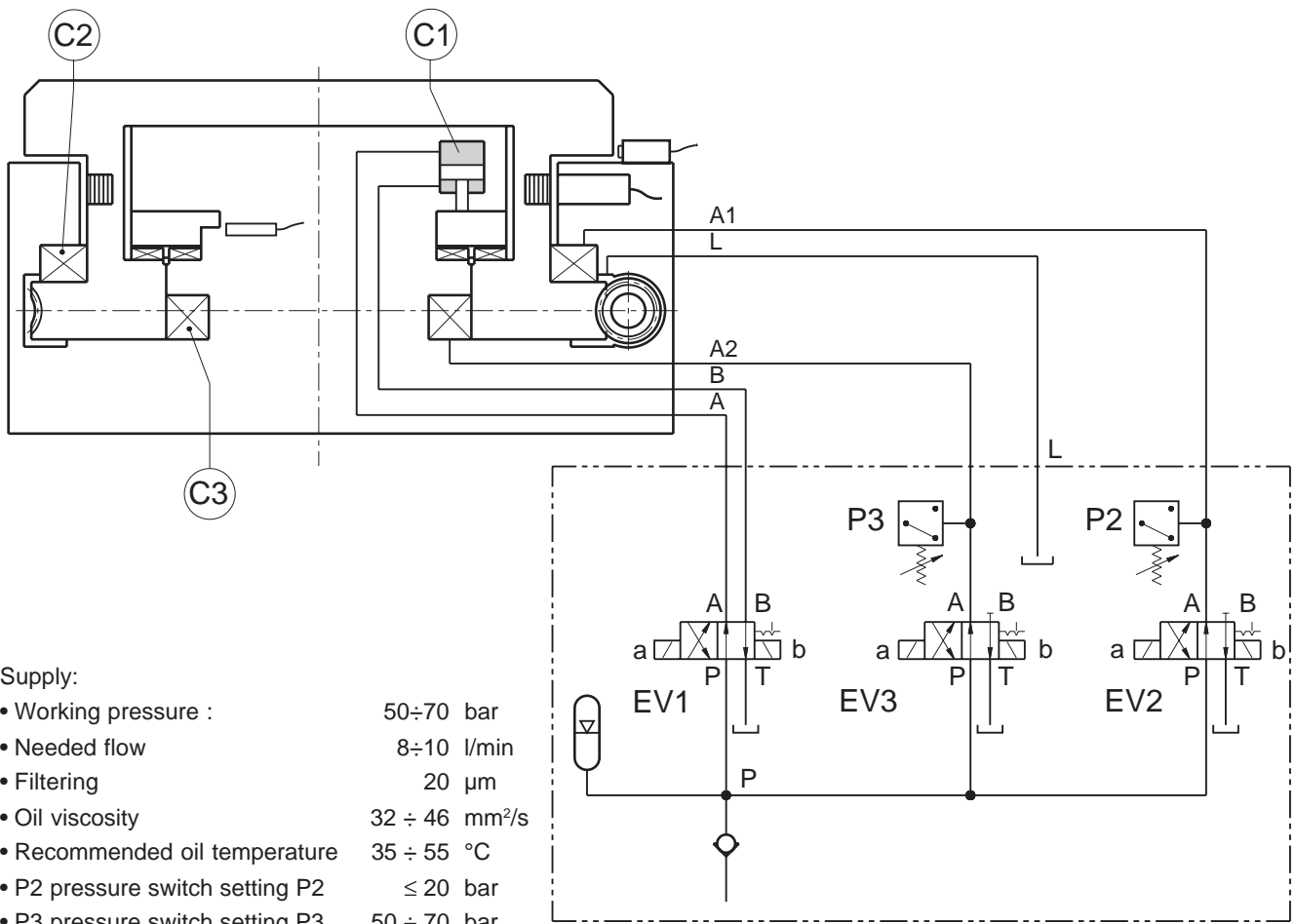
(front and back-machining)
OVERALL DIMENSIONS



NOTES:

- (1) Base plane to be defined according to the machine slide.
- (2) Electrical, hydraulic, connections for "B" Axis.
- (3) Electrical, hydraulic and coolant connections for SM-BR 16 turret.
- (4) "B - Axis" servomotor, excluded.
- (5) Turret servomotor, excluded.

RV-B16 TABLE HYDRAULIC DIAGRAM



| Functions | EV1 | | EV2 | | EV3 | |
|-----------------------------------|--------|--------|--------|--------|--------|--------|
| | sol. a | sol. b | sol. a | sol. b | sol. a | sol. b |
| Index clamping (every 5°) | - | + | - | + | + | - |
| Brake clamping (in any positions) | + | - | - | + | + | - |
| Unclamping for interpolation | + | - | + | - | - | + |

| GAS connections | | | | Required oil volumes | |
|-----------------|------------------------|-------------|------|----------------------|-----------|
| C1 | Indexing cylinder | clamped A | 3/8" | [cm ³] | 24 |
| | | unclamped B | 3/8" | [cm ³] | 12 |
| C2 | Brake cylinder | A1 | 3/8" | [cm ³] | 5 |
| C3 | Interpolation cylinder | A2 | 3/8" | [cm ³] | 3 |
| | Drain | L | 1/8" | | - |

Recommended nominal dimensions for hydraulic lines :
DN 10 for L ≤ 6 m
DN 12 for L > 6 m.

For **SM-BR16** hydraulic connections please refer to **I.T. 6445**.

