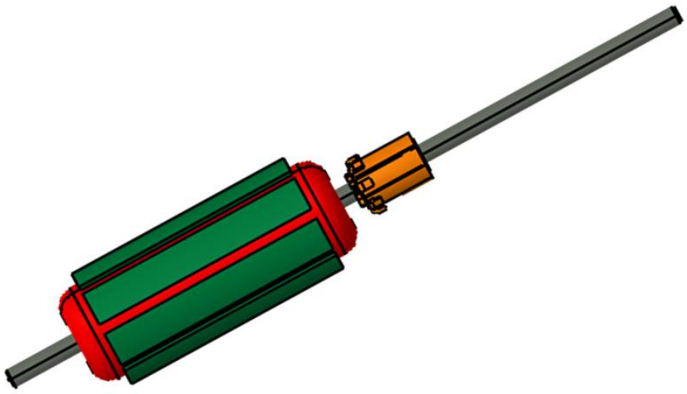
Order Specification

Balancing machine for AHC armature



The supplier must not release these specifications to third parties!

Accepting the order includes finally accepting the content of this specification.

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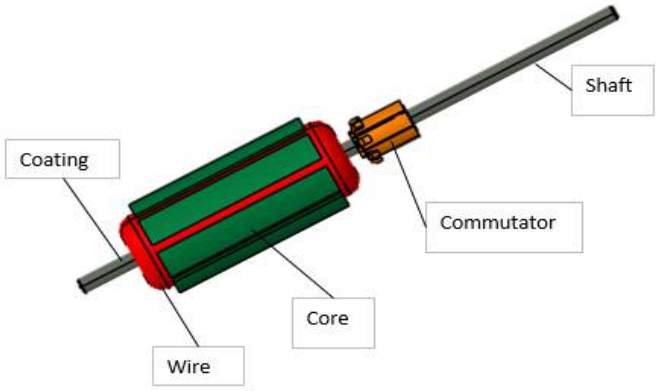
1. General Infomation

1.1. Project Infomation

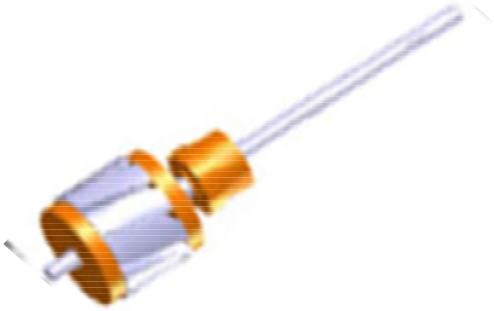
1.2.1. Project name	: AHC armature assembly line
1.2.2. Product	: AHC and AHC+ armature assembly
1.2.2. Submission of quotation	: 2017-02-28
1.2.3. Pre-acceptance	: 2017-10-16
1.2.4. Delivery	: 2017-11-17
1.2.5. Installation Date	: 2017-11-30
1.2.6. Final acceptance	: 2017-12-18
1.2.7. First O-Series(Pilot)	: 2017-12-26
1.2.8. SOP	: 2018-01-03
1.2.9. Production location	: Korea
1.2.10. BOSCH(RBKB) Contact	: RBKB/MSE-AT / Jeong Insu +82 44 279-6542 insu.jeong@kr.bosch.com

1.2. AHC armature Information

1.2.1 Components: AHC armature assembly



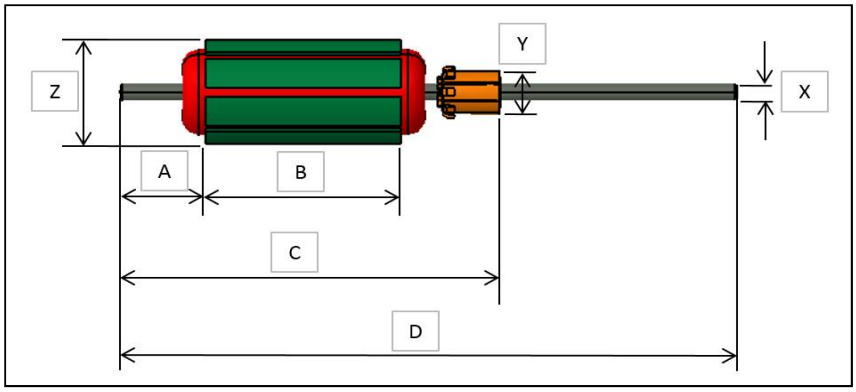
1.2.2 Components: AHC+ armature assembly



1.2.3 Basic Dimensions: AHC

.Dimension table below is only for referance.

.Exact dimension of product see drawings.

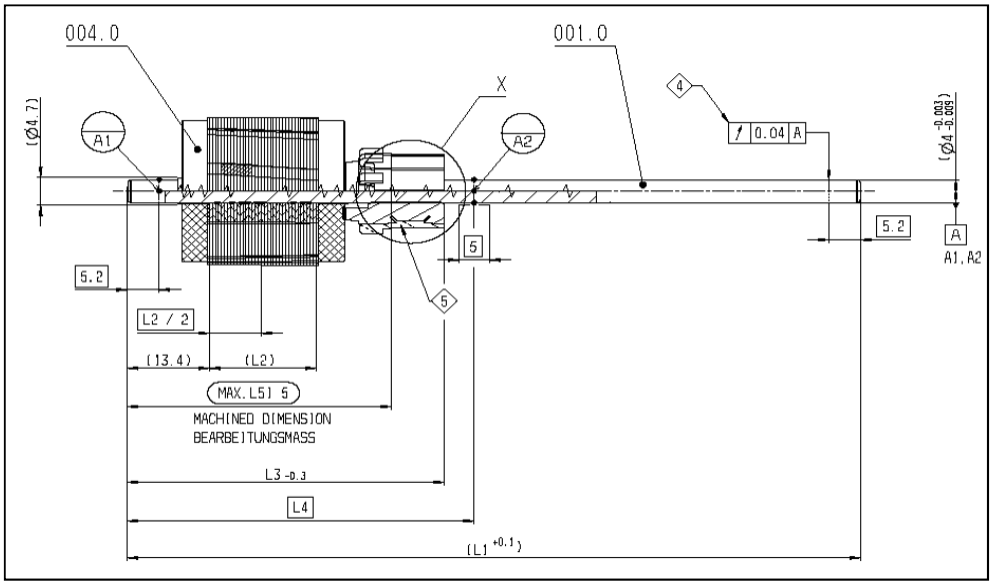


type	A (mm)	B (mm)	C (mm)	D (mm)	X (Φ mm)	Y (Φ mm)	Z (Φ mm)	Wire diameter (mm)	Winding pattern
AHC-2 long	18.65	44	85.8	139	4	10.1	24	0.28 ~ 0.335	symmetric double winding
AHC-2 short	18.65	30	70.8	124	4	10.1	24	0.28 ~ 0.335	symmetric double winding
AHC-P2 long	18.65	44	85.8	143	4	10.1	24	0.28 ~ 0.335	symmetric double winding
AHC-P2 short	18.65	30	70.8	128	4	10.1	24	0.28 ~ 0.335	symmetric double winding

1.2.4 Basic Dimensions: AHC+

.Dimension table below is only for referance.

.Exact dimension of product see drawings.



AHC+P LONG		128,1	35	69,4	74,3	60,6	53,85
AHC+ LONG		124,1	35	69,4	74,3	60,6	53,85
AHC+P SHORT		115,1	22	56,4	61,3	47,6	40,85
AHC+ short		111,1	22	56,4	61,3	47,6	40,85
FPS PLUG IN		129,6	17,5	51,9	66,3	43,1	36,35
FPS 2-PIN		120,1	17,5	51,9	56,8	43,1	36,35
DESCRIPTION BEZEICHNUNG	MODIFICATIONS INDEX AENDERUNGSINDEX	L1	L2	L3	L4	L5	L6

1.3. Machine requirements

- **Line Cycle Time** : Max. 5.0 sec.
- **Machine Cycle Time** : Max. 4.8 sec.
- **Working height** : 900 mm +/- 20mm
- **Production Flow Direction** **:** Left to Right
- **Work Piece Transportation** : Transfer by pallet on belt conveyor
- **Maximum Length** : (4.0m)
- **Maximum Width** : 3.6m
- **Color** : Ivory (RAL 1015 , D-31851)

1.3.2 Process station

1) Unbalance correction by milling

▶ Process description

Unbalance correction by milling according to FHW 3139919058. (see attachment)

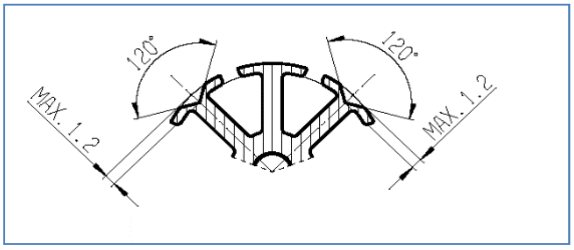
▶ Armature transport:

Automatic; armature vertical in pallet

▶ Controls

Unbalance correction control by milling according to FHW 3139919058.

Cutting shape should satisfy the drawing specification.



Dynamic compensation of unbalance for AHC type:

- allowed unbalance 0.54 gmm.

Static compensation of unbalance for AHC type:

- allowed unbalance 0.54 gmm.

Static compensation of unbalance for AHC+ type:

- allowed unbalance 0.30 gmm.

2. Contents of the Quotation

2.1. Spare Parts

- Spare parts for 1 year shall be included (based on 3 shift, 22h/day).

2.2. Tools

- All tools for half a year of production shall be included.

2.3. Consumption Parts

- All consumption parts for half a year of production shall be included.

2.4. Set-up and Try-out

- Set-up and try-out will be at RBKB Plant.

2.5. Training

- Training of RBKB staff (13 people, 5 days) will be done in RBKB at the line and initially during run-off and pre-acceptance at the manufacturers site..

2.6. Start of Mass-Production

- A production-start-supervisor for 1weeks will be needed after SOP at RBKB.

2.7. Try-out parts

- The manufacturer shall describe the amount of sample and parts for design, manufacturing and try out of the machines and the dates those parts will be needed. The amount and delivery date has to be defined with the purchasing contract.

2.8. Documentation

- In addition to the BOSCH standard, the supplier shall prepare the following documents for each machine 3× in Korean or English ：
  1) Letter of CE confirmation
  2) Manual
  3) Detailed and complete schemes

Contents of the Manuals:

- *Operating Instructions:*

* A complete set of drawings. Part drawings, assembly drawings and part lists including specification and part manufacturer (not only BOSCH-Number).
* All Flow-charts.
* Electric-pneumatic- and hydraulic schemes.
* Lay-out.

* Circuit diagram.
* Interface description.
* Basic setting data.
* Warranty documents.
* Software list.
* Software diskette.

- User Instructions :

* Preparation before using the machine.
* Machine start-up.
* Parameter setting.
* Trouble shooting.
* Maintenance procedure and interval.
* Change over chart.
* List of spare parts.
* List of wearing tools and parts.

2.9. By-Pass-Function at each Process

- A By-Pass-Function is needed to run the machine if one process is not necessary.
- The function must be applicable to each process independently.

3. Efficiency

3.1. Definition

Required are 85% during n hours.

3.2. Calculation

Efficiency will be calculated as follows :

$$Efficiency = \frac{goodparts \times lineCT \times 100\%}{n h \times 3600 sec.} > 85\%$$

n: number of hours for initial/final commissioning, incl. malfunctions due to technology

3.3. Coverage

Efficiency will cover : - one type change
- daily maintenance
- hourly cleaning.

4. Technical Interruptions

The percentage of technical production interruptions in the whole line has to be smaller than 1 percent while the 24 hour try-out.

$$FUSA\text{-}S = 100\% - \left(\frac{Interrupts \times 100\%}{\text{goodparts}} \right) > 99\%$$

FUSA : Failure and disturbance discovery (Fehler und Stoerungs Aufdeckung)

S : Value of disturbance factor (Stoerungswert)

5. Quality

The parts must be free of damages, scratches and clamping marks.

The tester will be checked using the MEGEF(Messgeraete Faehigkeit) system.

R&R(Reproducibility & Repeatability)Result : Max. 10%

- Standard deviation "s"
- Standard deviation of the measuring instrument "$\Delta s = s \times 1/\sqrt{2}$"
- Dispersion range of the measuring (Apparatus : SM)

SM = 6×Δs

SM% = SM/Tole.×100

SM%	
0 ~10%	: good
11~20%	: marginal
> 20%	: not acceptable

6. Failure

Failures are all parts that

- fall down,
- are rejected by either machine,
- are taken out during or after machine trouble.

The failure rate will be reduced by those failures the vendor is not responsible for.

$$FUSA\text{-}F = \frac{goodparts \times 100\%}{\text{Failure+goodparts}} > 98\%$$

F : Value of failure factor (Fehlerwert)

7. Tool Change

The time for a tool change by a skilled worker at either machine has to be mentioned
The production time lack for a tool change by a skilled worker has to be below 10min.
or the whole process. Quick tool change systems have to be applied. Pre-set
up Jigs for needed tools have to be applied.

8. Type-spectrum

Machine must be convertible to AHC and AHC+ types by changing the fixtures.

9. Lay-out

The quotation shall include a drawing of the line showing the following :

- Total machine Lay-out.
- All major dimensions.
- Control Cabinets including the opening of their doors.
- The final lay-out must be accepted by RBKB/MSE & TEF before the machine set-up at the vendor's plant.

10. Responsibility

The vendor has to take full responsibility for the tooling and ordered tools.

11. Electric Installation ; BOSCH Standard N51/M23

The electric installations and -controls have to be carried out according to the BOSCH standards and VDE guidelines.
Power supply in Korea : 220 V, 60 Hz, 3 Phase ground.
Standard parts which are to be used shall be found in Appendix 1.

12. Pneumatic Installation ; BOSCH Standard N51/M26

The pneumatic installations have to be carried out according to the BOSCH standards and VDI guidelines (e.g. VDI 3229).
Standard parts which are to be used shall be found in Appendix 1.
Generally BOSCH pneumatics shall be used.
Standard pressure is 5 bar.

13. Hydraulic Installation ; BOSCH Standard N51/M25

The hydraulic installations have to be carried out according to the BOSCH standards and VDI guidelines (e.g. VDI 3230). Standard parts which are to be used shall be found in Appendix 1.
Generally BOSCH hydraulic parts shall be used.

14. Mechanic Installation ; BOSCH Standard N51/M20

The BOSCH FMS profile shall be used as far as technically possible. Macralon safety covers shall be used. All steel parts must be corrosion protected.(Minimum black Oxyde)
All design drawings have to be accepted by RBKB-TEF in advance.

15. Cooling

RBKB is able to supply 32℃～37℃ at 5 bar from a central cooler.

16. Noise

The noise level has to be below 75㏈(A) measured in the distance of 1 m from the line.

17. Safety

General according to European standard EN292, EN294 (latest published), it has to be assured that there is no danger to any person. Macralon safety covers shall be used.
RBKB can provide a copy for reference by request.

18. Signal Lights

Each machine must be equipped with a separate status light with the following functions :

green	: working
green blinking	: waiting
yellow	: no part
yellow blinking	: tool change needed
red	: trouble
red blinking	: by-pass function

The lights must be easy to see from the operators from nearly every position within the line. They shall be attached in the middle of the two main tracks of the transfer system and their lower boarder shall have a distance to the ground of 2200 mm.

19. Central Power Supply

The line must be equipped with one main supply-panel. RBKB will only supply to this panel which has to be equipped with a main-breaker for the whole line and fuses.
Each machine has to be connected by Bus Duct.
The pneumatic tube must be equipped with an air-cleaner (with water release) between valves and pressure guard including dirt control.

20. Marking

20.1. Sensor Marking

- Sensors must be marked directly at the cable near the sensor. An engraved Aluminum plate shall be mounted on the cable via a metal ring and wire-bend.
- A second engraved Aluminum-plate shall be mounted on the machine body near the sensor. It must be clear that the two plates are related.

20.2. Motor Marking

- Motor marking shall be done similar to Sensor marking.

20.3. Pneumatic Marking

Valves :

- Valves must be marked directly on themselves using an engraved Aluminum plate.
- A second engraved Aluminum-plate shall be mounted on the machine body near the valve. It must be clear that the two plates are related.

Valve plugs :

- Valve plugs must be marked directly at the cable near the plug if there is no possibility to mark the plug itself. An engraved Aluminum plate shall be mounted on the cable via a metal ring and a wire-bend.
- A second engraved Aluminum-plate shall be mounted on the machine body near the socket. It must be clear that the two plates are related.

20.4. Marking of Machines

Type Plates according to ISO standards shall be mounted onto the back of all machines and Control cabinets.

Plates indicating the Manufacturers name shall not be mounted onto the machines.

Generally BOSCH marking-standards must be used.

Pneumatic and electric units must be marked themselves as well as their position must be marked on the machine body. Pressures which are different from satndard have to be marked on labels and mounted directly on to the related unit.

21. Maintain requirements

1) Wear parts must be changed easily. Wear parts are to be of a wearresistant design, Replacement of parts must not result in the specified tolerances being exceeded. The same also applies for replacement of the inductor.
2) Components subjected to severe wear are to be faced with hard metal (metal carbide).

22. Warranty

1) Warranty includes all parts (machining and purchasing) except the easy worn-out parts.
2) The warranty period starts after positive final-acceptance result. 1 year for the complete machine.

23. Service

The machine supplier guarantees Bosch that it will provide the following services:

1) When requested by Bosch (telephone, telex, e-mail, fax), service personnel must be dispatched in 24 hours.
2) Supplier shall provide training for RBKB employee including maintenance and operation as well

24. Shipping

Shipping shall be handled FOB.

25. Acceptance

25.1. Pre-acceptance

1) Pre-acceptance will be given after 8 hours of production at vendor's plant.
   The criteria according to this specification have to be fulfilled.
   The vendor has the responsibility to show the capability of either equipment.
2) Costs for necessary amendment at the expense of the supplier.
3) Pre-acceptance is given if:
   1. Item ‘acceptable parts’ with Cmk $\geq$ 1.67
   2. All Items in this specification.
   3. OPL (Open point list to existing problem) will be submitted. And supplier must solve all OPL and checked by BOSCH before delivery.

25.2. Final-acceptance

1) Acceptance will be given after 24 hours of production at RBKB. During acceptance production, the line must be operated by skilled operators.
2) Supplier should support RBKB to adjust machine for good dispensing quality. (problems caused by raw materials are not included.)
3) Final-acceptance is given if:
   1. Technical interruptions : FUSA-S : >99%
   2. Failure : FUSA-F : >98%
   3. Machine capability test : Item ‘acceptable parts’ with Cmk $\geq$ 1.67
   4. OPL (Open point list of pre_acceptance) solved.

26. Deviation

Each deviation to this specification has to be approved in advance by RBKB/MSE and TEF.

27. Purchasing Conditions

Please contact RBKB(RBKR) Purchasing Dept. directly

RBKB/MSE-AT / Jeong IS	RBKB/TEF / Hwang KH	Vendor
RBKB/MSE-AT / Hong SK	RBKB/TEF / Kim CY	