

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1-2006 Page 1 / 32
		Revision 4/2010



# SC-UMEB-SA



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## OPERATION MANUAL

**Three-phase squirrel cage induction motors in  
flameproof enclosure Ex d IIC or Ex de IIC  
type ASA frame size 63 - 315**

**APPROVED  
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SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 2 / 32 Revision 3

## OPERATION MANUAL

### Safety operating conditions for low voltage three phase asynchronous squirrel cage motors according to EC Relevant Directives

When operating these motors have turning parts and hot surfaces. All the operations during the transport, putting into operation and maintenance of these motors have to be made by qualified and authorised persons.

Accidents and/or damages may occur in case of inadequate operations.

These low voltage motors are intended for industrial use and they are in accordance with EN 60034 standard series. For their safe use in hazardous locations, additional instructions given in this Operation Manual have to be observed.

The manufacturer is not responsible for the accidents and damages risen from non-observance of present instructions.

#### 1. Denomination and using fields of motors

**1.1** These operation instructions refer to low voltage three-phase squirrel cage induction motors, type ASA, suitable for use in potentially explosive atmospheres, mainly in chemical and petrochemical industry.

These motors are used in industrial applications and comply with the following European Standards:

- EN 60034 (standard series) - Electrical machines
- EN 60034-6 – Rotating electrical machines – Part 6: Methods of cooling (IC Code)
- EN 60034-7 – Rotating electrical machines – Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM Code)
- EN 60034-14 – Rotating electrical machines – Part 14: Mechanical vibration of certain machines with shafts heights 56 mm and higher – Measurement, evaluation and limits of vibration severity
- EN 60079-0 - Electrical apparatus for potentially explosive atmospheres  
General requirements
- EN 60079-1 - Electrical apparatus for potentially explosive atmospheres  
Flameproof enclosure “d”
- EN 60079-7 - Electrical apparatus for potentially explosive atmospheres  
Increased safety „e”
- IEC 61241-0 – Electrical apparatus for use in the presence of combustible dust – Part 0: General requirements
- EN 61241-1:2004 – Electrical apparatus for use in the presence of combustible dust. Part 1: Protection by enclosures „tD”
- EN 60529 – Degrees of protection provided by enclosures (IP Code)
- Directive 94/9/EC – Potentially explosive atmospheres (ATEX)

The motors type of protection is:

- „Ex d IIC T5” and/or „Ex tD A21 IP66 T100°C” for the frame sizes 63-71 and

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SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 3 / 32 Revision 3

- „Ex d IIC T4” or „Ex de IIC T4” and/or Ex tD A21 IP66 T125<sup>0</sup>C” for the frame sizes 80-315.

They may be used as category II 2G or II 2GD devices having EPL Gb according to Directive 94/9/EC.

Cable entries are only suited for permanent wiring. The type of installation shall provide for adequate strain relief.

### 1.1.1 Notation and symbolisation

- The symbolisation of the motors type is made up of three groups of letters and figures in the following order:

- group ASA represents the motors series denomination
- group of the mounting dimensions
- group of poles number

Example of notation for a motor from ASA series having the stator frame size 90L, 4 poles:

Motor type ASA 90L-4

1.2 The motors are intended to operate under temperate (N) climate conditions, characterised by:

- ambient temperature: -33 ... + 40 °C
- relative humidity: 80% at + 20 °C
- altitude: max. 1000 m (above sea level)

1.2.1 The environment may contain potential explosive mixtures made of air and one of the substances pertaining to group C, temperature class T3, T4, T5, according to EN 60079-0 or mixtures made of air and combustible dust

**On request, motors operating under tropical (up to +50°C) or cold (till -55°C) climatic conditions are available. In the order should be indicated the operation/storage temperature**

1.3 The motors are not intended to operate under the following conditions:

1.3.1 In mines where applications require ExdI motors

1.3.2 In places where abnormal vibrations or repeated mechanical shocks at short time intervals are present (for example on vibrating placements).

1.3.3 In areas containing nuclear radiation

1.3.4 In places exposed to thermal radiation coming from the surrounding equipment

1.4 For the motors operating in areas where dust is present, care should be taken to avoid the dust deposits with thickness higher than 5 mm on the motor surface.

1.5 On demand, the manufacturer may build motors with other climatic protections

## 2. Requirements and operating parameters

2.1 The motors are manufactured for three-phase networks with symmetrical phase voltages and currents and the technical requirements regarding the supply voltage are according to EN 60034 -1

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 4 / 32 Revision 3

The motors are suitable for three-phase mains power supply with 400 V rated line voltage and for 50 Hz rated frequency

The overtemperature of the windings for the rated duty, at the rated parameters is in accordance with EN 60034 -1

In case the motors are fed at the limit values of the supply voltage according to EN 60034 -1 zone A, the increasing of the winding overtemperature by 10 K is permitted

On request, the motors can be manufactured for three-phase mains power supply having other rated voltages up to 500 V, for 63-90 framesize motors or 690 V for 100-315 motors. On request, motors for frequency of 60 Hz are also available.

*The motors can be fed from PWM frequency converters (VACON or similar) according to the torque/speed characteristic  $M=f(\text{Hz})$  given in Annex 8. For that application the motors are equipped with direct temperature control using the embedded PTC sensors ( $130\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ). ~~For motors having "Ex e" terminal boxes care should be taken to ensure that any overvoltage spikes and higher temperatures produced within the terminal box are taken into consideration (compare EN 60079 part 14 par. 10.6).~~*

The rated guaranteed parameters at the rated supply voltage 400V and rated frequency 50 Hz are indicated in **Annex 3**.

The tolerances of the rated guaranteed parameters adhere to EN 60034–1, table 20

The tolerance of the noise level is +3 dB.

The parameters influenced by the operating location are guaranteed under the conditions stipulated at par. 1.2.

- 2.2** The motors are manufactured using insulating materials of class F  
The windings insulating resistance should not be lower than:
- 20 MOhm in cold condition
  - 3 MOhm in warm condition
- 2.3** The motors rated duty is the continuous duty S1, according to EN 60034 –1 par. 4.2.1. but frequency converter feeding according par. 2.1 is also allowed.
- 2.4** The normal degree of protection according to EN 60529 of the motors operating in Zone 1 is IP55. On request, motors having IP 56, IP 65 or IP 66 protection degree are also available.
- 2.4.1** The protection degree of the motors operating in Zone 21 is IP66.
- 2.5** The method of cooling of the motors according to EN 60034 –6 is IC 411.
- 2.6** The motors could be manufactured in the following mounting arrangements:  
IM 1001, IM 1002, IM 2001, IM 3001, IM 1011, IM 3011 for the frame sizes 80-315 and IM 3601 only for the frame sizes 63 -160, according to EN 60034-7  
The overall and mounting dimensions are indicated in:  
- Annex 4 - Table 1 for the constructive types IM 1001  
- Annex 4 - Table 2 for the constructive types IM 3001
- 2.7** The clearances in normal operation between the external fan and its hood, the motor shields and their fasteners, according to EN 60079-0 par. 17.4 should be at least 1/100 from the maximum diameter of the fan but not less than 1 mm.  
Mounting types with the shaft end facing downwards are to be provided with a cover (canopy) preventing foreign bodies from falling into the ventilation openings.

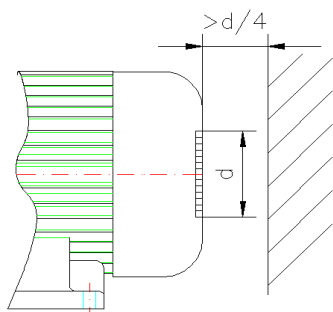
SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 5 / 32 Revision 3

Ventilation must not be obstructed and the outgoing air –also including that from the adjacent units - must not be directly sucked in again.

The clearances between the NDE-side fan cowl and adjacent solid obstacles must not be lower than one quarter of the air inlet diameter (see following fig.)

The distance between the complete motor housing and any solid obstacle shall not be smaller than

Gas / vapour subgroup	Minimum distance [mm]
II A	10
II B	30
II C	40



**2.8** The terminal boxes are dimensioned for connecting armoured copper cables.

The terminal boxes are fitted with:

- 1 terminal plate with 6 terminals for the frame size 63-71
  - 3 or 6 bushings and optionally with one BT18 bushing for additional protective devices for the frame sizes 80 – 315.
  - 1 or 2 IPE or metric cable entries for the frame sizes 63 – 132
  - 2 IPE or metric cable entries for the frame sizes 160 – 315
- Optionally, the terminal boxes could be provided with an additional cable entry having the size IPE 16 or M20x1.5 for the frame size 63-315.

**2.9** The motors type of protection is:

- flameproof enclosure „d” for the frame size 63-315
- flameproof enclosure „d” having an increased safety „e” as an option for the terminal boxes in case of 80 – 315 framesize motors
- tD A21 for the frame size 63-315

**2.10** The motors are designed for „IIC” gases group, according to EN 60079-0:2004, being also suitable for applications that require group „II A” and „IIB” motors. They are intended for the use as category II 2G , EPL Gb equipment.

**2.10.1** The motors designed tD A21 are suitable for applications in Zone 21, according to EN 61241-14, being also suitable for applications in Zone 22.

**2.11** The temperature class T3, T4, T5 indicates the maximum surface temperature of the enclosure and is confirmed by the EC-type-Examination Certificate.

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 6 / 32 Revision 3

**2.11.1** T100<sup>0</sup>C and T125<sup>0</sup>C indicates the maximum surface temperature of the motors which operate in explosive dust atmosphere and is confirmed by the EC-type-Examination Certificate

### 3. Product description

The flameproof enclosure consists of:

- a. cast iron or welded steel housing
- b. cast iron shields
- c. cast iron terminal box
- d. cast iron terminal box cover

To provide the flameproof enclosure with necessary mechanical features, only screws of the strength class minimum 8.8 shall be used as assembling elements.

The motors are equipped with rolling-contact bearings.

The motors up to frame size 250 are equipped with prelubricated bearings; regreasable bearings are used for motors with frame sizes 280 and 315. The bearing selection is given in table 1.

The bearings are not dimensioned to support external axial forces.

The maximum permissible radial forces on the shaft end for minimum 20.000 hours bearings life, are given in Annex 5

**Table 1**

Frame size	Drive end		Non drive end	
	2p = 2	2p = 4, 6, 8	2p = 2, 4, 6, 8	
<b>63</b>	6202 2Z P6		6202 2Z P6	
<b>71</b>	6203 2Z P6		6203 2Z P6	
<b>80</b>	6304 2Z P6		6304 2Z P6	
<b>90</b>	6305 2Z P6		6305 2Z P6	
<b>100</b>	6306 2Z P6		6306 2Z P6	
<b>112</b>	6307 2Z P6		6307 2Z P6	
<b>132</b>	6308 2Z P6		6308 2Z P6	
<b>160</b>	6310 2Z P6		6310 2Z P6	
<b>180</b>	6311 2Z P6		6311 2Z P6	
<b>200</b>	6312 2Z P6		6312 2Z P6	
<b>225</b>	6313 2Z P6		6313 2Z P6	
<b>250</b>	6313 2Z P6	6314 2Z P6	6313 2Z P6	
<b>280</b>	6314 P6	6316 P6	6314 P6	
<b>315</b>	6315 P6	6317 P6	6315 P6	
<b>315M/L</b>	6316 P6	6319 P6	6316 P6	6319 P6

The type of main cable entries for minimum supply cable diameter is given in the tables below:

**Table 2.1**

Frame size	Entry thread size	Size Dxd	Minimum admissible supply cable diameter [mm]	Assembly torque limits [Nm]
<b>63</b>	IPE 16	20x11	10.5	20

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 7 / 32
		Revision 3

<b>71</b>				
<b>80</b>				
<b>90</b>				
<b>100</b>	IPE 21	26x10	9.5	27
<b>112</b>		26x13	12.5	
		26x16	15.5	
		26x19	18.5	
<b>132</b>	IPE 29	35x18	17.4	27
<b>160</b>		35x21	20.4	
<b>180</b>		35x24	23.4	
		35x27	26.4	
<b>200</b>	IPE 36	45x24	23.4	54
<b>225</b>		45x27	26.4	
		45x30	29	
<b>250</b>	IPE 42	45x33	32	107
		52x30	29	
<b>280</b>		52x33	32	
		52x36	35	
<b>315S/M and 315M/L</b>	IPE 48	52x39	38	120
		57x36	35	
		57x39	38	
		57x42	41	
Optional entry for prot. devices	IPE16	20x11	10.5	20

**Table 2.2**

Frame size	Entry thread size	Size Dxd	Minimum admissible supply cable diameter [mm]	Assemblytorque limits [Nm]
63	M25x1.5	23x11	10.5	20
71				
80				
90				
100	M32x1.5	30x10	9.5	27
112		30x13	12.5	
		30x16	15.5	
		30x19	18.5	
132	M32x1.5	30x16	15.5	27
		30x18	17.4	
		30x21	20.4	
160	M40x1.5	38x18	17.4	54
180		38x21	20.4	
		38x24	23.4	
		38x27	26.4	
200-225	M50x1.5	48x24	23.4	107
225-250		48x27	26.4	
		48x30	29	

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 8 / 32 Revision 3

250		48x36	35	
280	M63x1.5	61x30	29	120
		61x36	35	
315 SM/ML		61x42	41	
		61x45	44	
Optional for prot. dev.	M20x1.5	18x11	10.5	20

**NOTE:** Maximum diameter of the supply cable is to be considered as the maximum diameter of the cable that can be introduced by hand, into the sealing ring of the cable entry.

On request, the terminal box with an additional IPE 16 or M20x1.5 cable entry is also available.

The cable entries are only suited for permanent wiring.

#### 4. Measurement and control devices

The following measurement and control devices are needed when commissioning or maintaining the motors:

- megohmmeter of 1000 V, to measure the insulation resistance
- voltmeter to check the supply voltage
- ammeter to measure the phase currents
- tachometer to measure the speed

#### 5. Special tools and spare parts

In order to mounting and dismounting the motors wrench assortments (hex key wrenches, wrenches for hexagon screws) and bearing mounting/dismounting appropriate tools are to be used. The tools are not included in the motors delivery inventory.

The spare parts are listed in Annex 7 and are delivered at client's request.

**Only original spare parts are allowed to use for flameproof motors.**

#### 6. Preparing for commissioning

##### 6.1 Unpacking

The motors that are not commissioned immediately after delivery shall be stored in their initial packing, in dry rooms, away from freezing, oxide vapours or corrosive substances.

The removing of the packing should be carried out in clean rooms, at ambient temperature of minimum +15 °C and maximum 70% relative humidity.

The integrity of mounting surfaces with the driven installation:

- shaft end
- flange shoulder (if case is)
- feet and fixing holes (if case is)

need to be checked.

If rust appeared on these surfaces, they will be cleaned with smooth cloth and thinner, then a thin film of anti-rust grease according to the technical quality conditions – Annex 6, will be applied.



<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 9 / 32 Revision 3

## 6.2 Preliminary checking before mounting

Before mounting will be checked:

**6.2.1** whether the shaft rotates easily by mere hand rotating

**6.2.2** the protective painting and coating condition

**6.2.3** the insulation resistance; if the value of winding insulation resistance is below 20 MΩ, the motor should be dried. The drying could be carried out:

- introducing the motor in a drying kiln, for several hours at maximum temperature of 80 °C
- blowing the motor with an air stream having maximum temperature of 80 °C
- running the motor at no load (if the actual conditions allow)

The drying is finished when the winding insulation resistance keeps constant at a value no lower than 20 MΩ.

**6.2.4** The bearing lubrication condition is checked enabling the motor to no-load run.

If abnormal noise, local heat or locking symptoms arise, then:

- prelubricated bearings must be replaced
- in case of regreasable bearings: the old grease must be removed and fresh grease UM185Li3 or Shell Alvania R3 should be used to relubricate them. If the troubles persist, the bearings should be replaced with new ones.

## 6.3 Preparations before mounting

The mounting location should:

- enable easy acces to the motor terminal box
- not obstruct the motor ventilation
- be away from heating sources
- enable the access of surveillance and maintenance personnel

In order to remove dust or other solid particles from the outer surface, before mounting the motor should be blown off with high pressure dry air.

The data on the motor rating plate should be checked to meet the driven equipment requirements as to:

- rated output
- rated speed
- voltage and frequency
- connection
- hazardous area classification

## 6.4 Coupling

Depending on the driven mechanism and operation conditions there are several ways to transmit the motor torque.

**Be aware for adherence to Directive 94/9/EC also for the transmitting devices. They have to be ATEX certified too.**

### 6.4.1 Flexible coupling

It is the most frequent type of coupling, but special attention should be paid to accurate alignment of the motor with the driven equipment

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 10 / 32
		Revision 3

Any failure in correct alignment entails vibrations, noisy functioning, bearing additional strains and eventually bearings and winding damaging.

#### 6.4.2 Belt coupling

Only those belts may be used which do not electrostatically charge. Motor is mounted on slide bars ensuring belt tensioning which may subsequently be corrected.

Exaggerated belt tensioning leads to high radial loads on bearings and shaft end while insufficient tensioning leads to belt „stroke” and the rotor torque transmission is no longer possible.

It should be observed that for the mounting arrangements IMB6, IMB7, IMB8, IMV5 and IMV6 the belt tension is only permitted to act parallel to the mounting surface or towards the mounting surface and when mounted, both feet (in case of foot-mounting arrangements) must be secured and supported.

#### 6.4.3 Gear coupling

In this case the shafts of the motor and driven equipment must be parallel and the tooth gears must function accurately in order to prevent bearings overloads and premature wear.

Before mounting the coupling, driving pulley or toothed gear a thin layer of grease will be applied on the motor shaft end ensuring thus easy mounting of the driving parts.

The transmission elements should be mounted with the press. They should be pressed up to the shaft end collar.

#### 6.5 Electrical connection

The rules regarding electrical installations in hazardous atmospheres are to be strictly observed. All mounting and installation works must be performed by experienced personnel in accordance with EN 60079-14 and local authority regulations.

And they must be carried out on standstill machine , isolated and secured against reconnection only. Check safe isolation from supply !

Line cables and their installation shall adhere to EN 60079-14.

The motors are provided with six terminals and they may be started either by network direct connection or by means of star-delta switch or another starting device limiting the motor starting current. The star-delta starting is only possible in case of delta working connection.

**Warning !** When supplying the motors with increased safety „e” terminal box, marked accordingly, special care must be given to:

- Correct connection of the cables to the terminals by means of connection devices (see connection diagrams Annex 1), so that the creepage and clearance distances are closely observed.
- Tightening to torque values indicated in paragraph 6.8.2.1 of the electric connecting devices
- Correct mounting of all cable entry devices as well as the terminal box cover with a view to preserve the motor protection degree.

**Warning !** When supplying the motors with flameproof „d” terminal box, special care must be given to:

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 11 / 32
		Revision 3

- Tightening to torque values given under paragraph 6.8.2.2 of the screws fixing the terminal box cover
- Tightening to torque values indicated in paragraph 6.8.2.1 of the electric connecting devices
- Correct mounting of all cable entry devices as well as screwing the presser according to torque values indicated in tables 2.1 and 2.2.

To connect the supplying cables to the motor terminals, the user should:

- take off the cover of the terminal box using an appropriate hex key wrench
- unscrew the presser (thread adapter) using a hexagon wrench, then take off the compression ring, the wall and the sealing gasket
- introduce the supplying cable through the presser, compression ring and sealing gasket
- introduce the cable into the terminal box
- put into correct position the sealing gasket, compression ring and the presser. When screwing the presser it presses on the sealing gasket and this one, at its turn, on the cable sheath ensuring thus the sealing of the terminal box
- connect the supply cable to the motor terminals;
- before connecting the lead to the earth terminal in the terminal box, clean to white metal the contact surfaces and cover them with a thin layer of conductible grease
- close the terminal box mounting the cover

**Warning !** The terminal boxes must always be tightly closed during motor operation.

#### 6.6 Connection to earth terminal

Is made by means of low resistivity multicore cable in accordance with labor safety rules. Appropriate conventional symbols indicate the location of the earth terminals on the housing.

To connect the protection lead to the earth terminal, the user should take off the screw and the washers, clean to white metal the contact surface, apply a thin layer of conductible grease (e.g. copper grease) then connect the lead fastening the screw.

#### 6.7 Overload protection

The user should protect the motors against overload currents exceeding the rated current values indicated on the rating plate.

According to EN 60079-14 chapter 7, the overload protective device shall be :

- a current-dependent, time lag protective device monitoring all three phases, set at not more than the rated current of the machine, which will operate in 2 h or less at 1,20 times the set current and will not operate within 2 h at 1,05 times the set current
- another equivalent device

#### 6.8 Checking the mounting accuracy

Before connecting the motor to the supply network it is recommended to check whether:

**6.8.1** All fixing parts are tightened

**6.8.2** Coupling with the driven equipment is correct

All screws and electric contact nuts are tightened and earth connection is correctly made. The following torque limits (screw and nut) are applicable

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 12 / 32
		Revision 3

**WARNING!** Screws which become unusable have to be replaced by new ones of the same strength class (min.8.8) and type

#### 6.8.2.1 Screwed joints for electrical connections

Thread	Tightening torque [Nm]
M4	1.2
M5	2
M6	3
M8	6
M10	10
M12	15.5

#### 6.8.2.2 Screwed joints strength class 8.8 only in components with higher strength (e.g. grey cast iron, steel)

Thread	Tightening torque [Nm]
M4	2.3
M5	4.5
M6	7.9
M8	19
M10	38
M12	68
M14	105
M16	160

6.8.3 The access to the electrical parts is prevented

6.8.4 All switching devices are put in position „0” or „off”

6.8.5 The free access of cooling air is not obstructed (the cowl's holes are not obturated)

6.8.6 The rules regarding electrical installations in hazardous atmospheres are strictly observed

If all above conditions are observed then a motor test start is to be performed with a view to check the rotation direction and if there are no vibrations or abnormal noise.

If the rotation direction is not the required one, the motor is to be disconnected and the direction of rotation can be reversed by changing the position of two mains conductors on the terminal board.

If a new test start proves that the motor works properly than it is ready to operation.

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 13 / 32 Revision 3

**7. Main possible faults and remedies**

**Table 3**

No.	Fault	Possible causes	Remedy
1.	The shaft does not turn when manually rotated	a. Locked bearings	Replace the bearings
		b. Locked bearings	Wash the bearings and regrease them with recommended grease
		c. Fan cover deformed causing rubbing by the fan	Repair or replace the fan cover
2.	No loaded motor fails to start	a. Two phase supply	Check the connexions to the terminal box, to the mains as well as the supply cable
		b. Wrong winding connection (in case of 6 terminal ends)	Check the connections to the terminal box
		c. Locked rotor	Check whether the driven mechanism is not jammed
3.	The motor does not start in load	a. See the causes and remedies under item 2	
		b. Mains voltage too low	Check connection at the mains
		c. Motor load is higher than the rated value	Compare data on the rating plate
4.	High decrease in speed	a. Mains voltage too low	Check connection at the mains
		b. Motor load is higher than the rated value	Observe data on the rating plate
		c. The supply cable insufficiently sized (too high voltage drop on cable)	Use a supply cable correctly sized
		d. Mains low frequency	Check connection at the mains
5.	Uneven phase currents	a. Faulty contact in a connection point of the supply circuit	Check the electric circuit
		b. Shortcircuit in the motor winding	Re-wind the stator
6.	Noise and vibrations in the motor	a. Faulty coupling	Check the coupling
		b. Damaged bearings	Replace the bearings
		c. Unbalanced rotor	Balance the rotor
7.	Protective devices disconnect the motor at start	a. See faults and remedies under item 2.	
		b. Shortcircuit in the motor winding	Re-wind the stator
		c. Wrongly adjusted protection	Adjust correctly the protection
8.	Low insulation resistance	a. Motor non-operation too long	The motor winding should be dried according to the methods given in 6.2.3
		b. Environment moisture above normal limits	
		c. Ingression of water inside the motor	
9.	Over heating of the motor	a. Cowl's holes are covered	Enable free access of cooling air
		b. Heavy amount of dust between the cooling ribs of the housing or another dregs	Clean the housing removing the dust
		c. Fan blades broken	Replace the fan
		d. Over-current	Adjust correctly the overload protection device

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 14 / 32 Revision 3

## 8. Motor dismantling

The ASA type motors are flameproof motors, and their joints should meet special requirements so that flameproof character is observed.

**Warning !** Only workshops authorised to carry out maintaining and repairing works of electrical equipment in flammable atmospheres are allowed to mount or dismount ASA type motors.

Do not dismount when the motors are energized

### 8.1 Dismounting of the terminal box (see fig. 1 and 2)

- dismount the terminal box cover (1) enabling thus the access to the screws fixing the supply cable to the terminals (bushings).
- using a hexagon wrench unscrew the presser (2) and take off the supply cable from the terminal box
- remove the terminal box (3) using an adequate device
- unscrew the nuts (4) at the bottom of the terminals, loosening the wire terminals
- the bushings can be removed using a socket wrench after the terminal box is dismantled

### 8.2 Dismounting of the fan (see fig 1 and 2)

- remove the fan cowl (6); in case of motors with regreasable bearings, prior to removing the cowl, the lubricating devices (5) must be taken off
- remove the safety ring (7)
- using an adequate device remove the fan (8) from the shaft

### 8.3 Dismounting of the rotor (see fig 1 and 2)

- dismantling should be made observing the operation succession given in fig. 1 and 2
- using appropriate dismantling devices (mechanical presses with threaded rods and central screw), the shields should be pulled-off from the housing. When pulling the shields, the pressure should be applied gently, evenly, to avoid the damaging of the contact surfaces forming flame-proof joints or the bearings.

### 8.4 Dismounting of the bearings

- Mechanical jaw pullers or other proper dismantling tools should be used to remove the bearings from the shaft or from the shields

### 8.5 Re-mounting of the motor

- It should be done in reverse order of the dismantling operations (see fig. 1 and 2)
- Before mounting, the surfaces forming flameproof joints between stator-shields, stator-terminal box, terminal box-terminal cover and the thread joints of the cable entries, shall be protected with a thin layer of grease having the technical parameters according to **Annex 4** or other similar grease.

**WARNING !** During dismantling or mounting operations special care must be taken to avoid the scratching or damaging the surfaces forming flameproof joints.

**Repair and overhaul of the flameproof gaps are only allowed according constructive information given by the original manufacturer. A repair according to the values given in Table 1 or Table 2 of EN 60079-1 is not permitted.**

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 15 / 32

Revision 3

## 9. Maintenance rules

- Care must be given to bearing maintenance, to monitoring their heating and noise level
- Bearing appropriate functioning requires clean mounting places, free of dust or other contaminants, using of proper mounting tools, recommended lubricants.
- The motors of frame size 280-315 have a greasing system enabling the bearings to be lubricated during the operation. The bearing relubrication intervals and quantity of grease are shown in the **Table 4**.
- To relubricate the regreasable bearings use UM 185 Li3 grease or similar types: Shell Alvania R3, SKF LGTH3 or UTJ 185 Li2/3
- In case of damaging, the sealed bearings should be replaced with similar ones.
- Before remounting the surface of the shields coming in contact with the housing should be cleaned and covered with a thin layer of anti-rust grease
- The insulation resistance should be periodically checked; a value under 1 MΩ warns that a damage caused by dirt deposits on the insulating surfaces or moisture penetration in the stator winding can occur. Clean the winding and dry it in accordance with par. 6.2.3
  
- **Daily** – check:
  - whether the acces of cooling air through the inlet openings is not obstructed and the outlet openings are not obstructed; remove any obstacles preventing motor good ventilation
  - stator and bearings temperature
  - whether the current, voltage and frequency comply with the values on the rating plate
  
- **Weekly** – check:
  - whether the motor is securely fixed
  - the insulation resistance
  - the bearings proper operation
  - the alignment and coupling condition
  
- **Monthly** – check:
  - whether the electrical connections and earthing are securely tightened
  - the condition of assembling devices
  
- **Quarterly** – check:
  - whether the electrical connections and earthing are securely tightened
  - the insulation resistance
  - whether the motor is securely fixed
  - the bearings proper operation; if necessary relubricate the regreasable bearings, using the grease type and quantity indicated by the motor manufacturer
  
- **Half-yearly** – check:
  - the bearings for wear or damages; replace the bearings, if necessary

SC UMEB SA	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 16 / 32
		Revision 3

- **Yearly** – motor thoroughly examination;
  - if the rust occurred the affected parts should be cleaned and then painted or electrochemical coated
  - check the bearings and relubricate them (regreasable bearings) according to instructions or replace the damaged ones
  - check the insulation resistance and clean the winding if necessary
  - check the cable entry, verify the sealing rings condition, the tightening of cable conexions in the terminal box

#### 10. Marking, Packing, Transport, Storage

**Marking** – the rating plate is placed visibly on the motor and is marked according to EN 60034-1 and EN 60079-0 requirements

**Packing** – The packing type depends on the means of transport and should prevent motor from damaging during the transport.

**Transport** – The motors should be transported in tarpaulin vans or trucks, fastened against their decks. Mechanical shocks should be avoided when loading or unloading the motors.

**Storage** – Until commissioning the motors will be kept in their original packing, stored in low-vibration and dry places (max. humidity 80% at +25 °C), with ambient temperature of -5 °C...+40 °C, free of corrosive gases or dust.

The motors which have to be stored a longer period in wet ambiances will be packed in polyethylene foil with bags of humidity-absorbing substances (i.e. Silicagel).

#### 11. Safety instructions

- all works for connecting, commissioning and maintenance are to be done by qualified, authorised specialists in accordance with EN 60079 part 14, 17 and 19 and local authority regulations
- before commissioning, motor correct connection to the supply mains and safe earth connections are to be verified. It is forbidden to operate the motors that are not connected to earth
- all rotating parts (pulleys and couplings) should be covered to prevent accidental contacts
- it is forbidden to remove the fan cover or terminal box cover while the motor is operating or voltage is applied
- all works are allowed only with the motor at standstill, electrically disconnected and and isolated and secured against reconnection furthermore



**12. Timetable with completion and greasing intervals of regreasing ball bearings**

**Table 4**

**Horizontal mounting IM B**

Frame size	Bearing basic	Operating conditions		Bearing Op. temperature [°C]		Relub. interval [hrs]	Correcting interval [hrs]	Grease Quantity [g]	
		Speed [rpm]	Op.hrs/day [hrs]	Normal	High				
280	6314	2970	24	Normal	63 ÷ 78	4800	1700	26	
		≤1470		High	78 ÷ 93		800		
	6316	≤1470		Normal	63 ÷ 78	12100	4200		
				High	78 ÷ 93		2100		
315	6315	2970		24	Normal	63 ÷ 78	4500	1400	30
		≤1470			High	78 ÷ 93		700	
	6317	≤1470			Normal	63 ÷ 78	11400	4000	
					High	78 ÷ 93		2000	
315M/L	6316	2970	24		Normal	63 ÷ 78	10000	3500	37
		≤1470			High	78 ÷ 93		1800	
	6319	≤1470			Normal	63 ÷ 78	3700	2000	
					High	78 ÷ 93		1000	
315M/L	6316	2970		24	Normal	63 ÷ 78	8700	3000	45
		≤1470			High	78 ÷ 93		1500	

**Vertical mounting IM V**

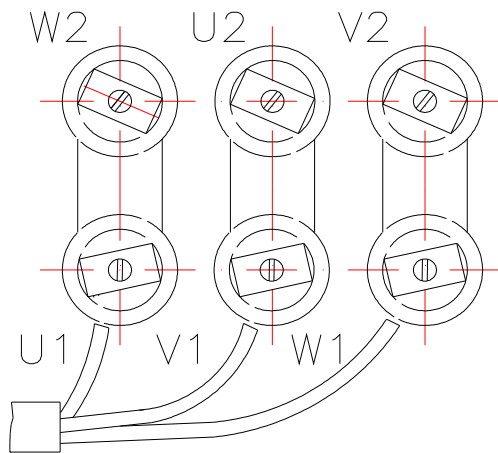
280	6314	2970	24	Normal	63 ÷ 78	4800	800	26	
		≤1470		High	78 ÷ 93		400		
	6316	≤1470		Normal	63 ÷ 78	12100	2100		
				High	78 ÷ 93		1100		
315	6315	2970		24	Normal	63 ÷ 78	4500	700	30
		≤1470			High	78 ÷ 93		400	
	6317	≤1470			Normal	63 ÷ 78	11400	2000	
					High	78 ÷ 93		1000	
315M/L	6316	2970	24		Normal	63 ÷ 78	10000	1800	37
		≤1470			High	78 ÷ 93		900	
	6319	≤1470			Normal	63 ÷ 78	3700	1000	
					High	78 ÷ 93		500	
315M/L	6316	2970		24	Normal	63 ÷ 78	8700	1500	45
		≤1470			High	78 ÷ 93		800	

**Contamination/Moisture** – Moderate  
**Load** – No  
**Shock Load** – No  
**Ambient Temperature** – Average

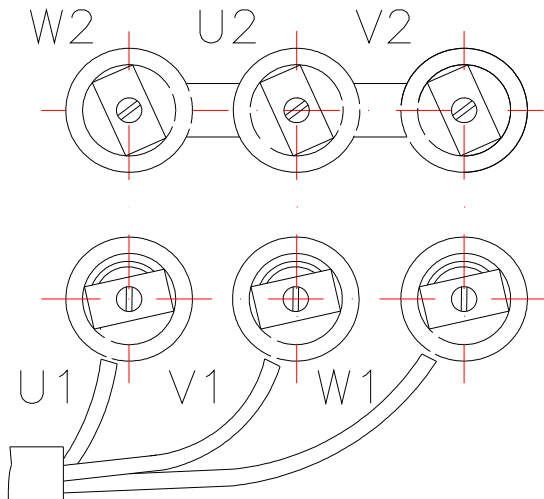
**CONNECTION OF THE SUPPLY CABLES TO THE TERMINALS**

**Annex 1**

- 1. **Direct starting. The motor has DELTA ( $\Delta$ ) connection**  
**Frame size 63 - 315**



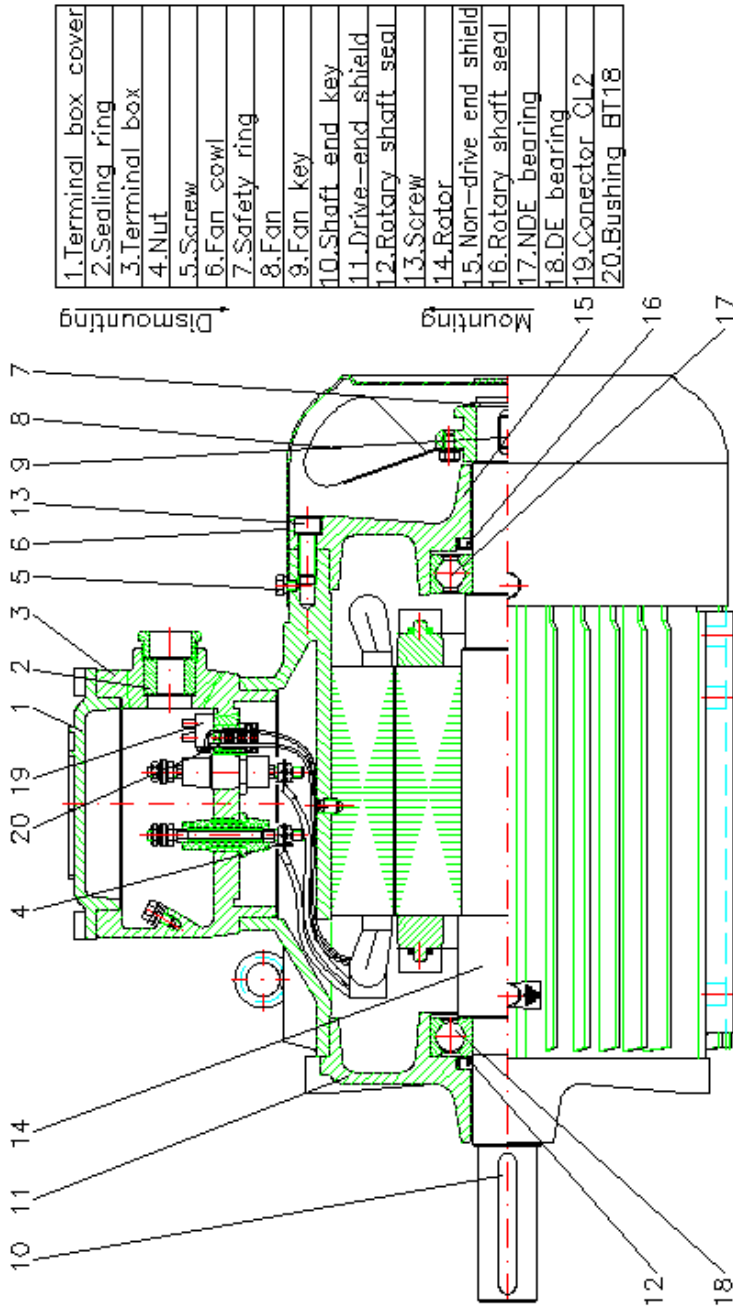
- 2. **Direct starting. The motor has STAR (Y) connection**  
**Frame size 63 - 315**



Frame size 63-160

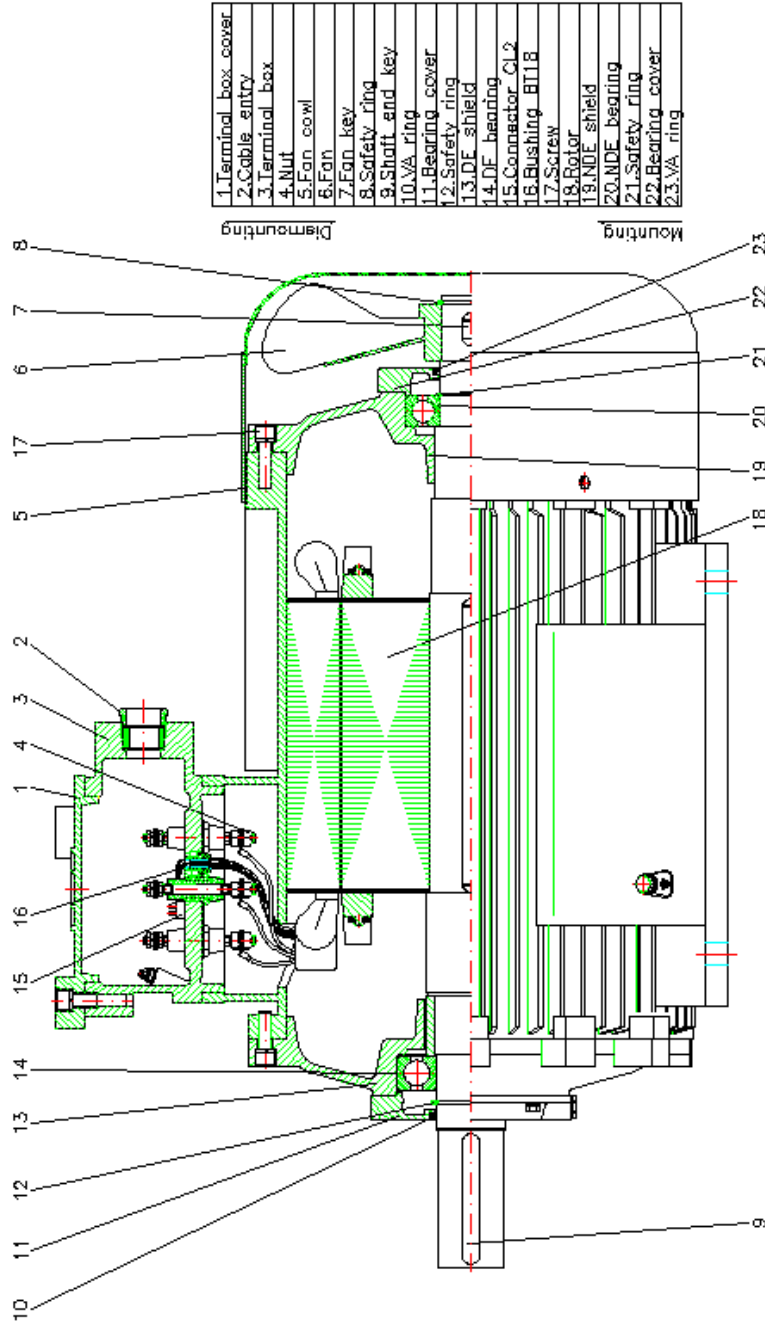
Annex 2

Fig.1



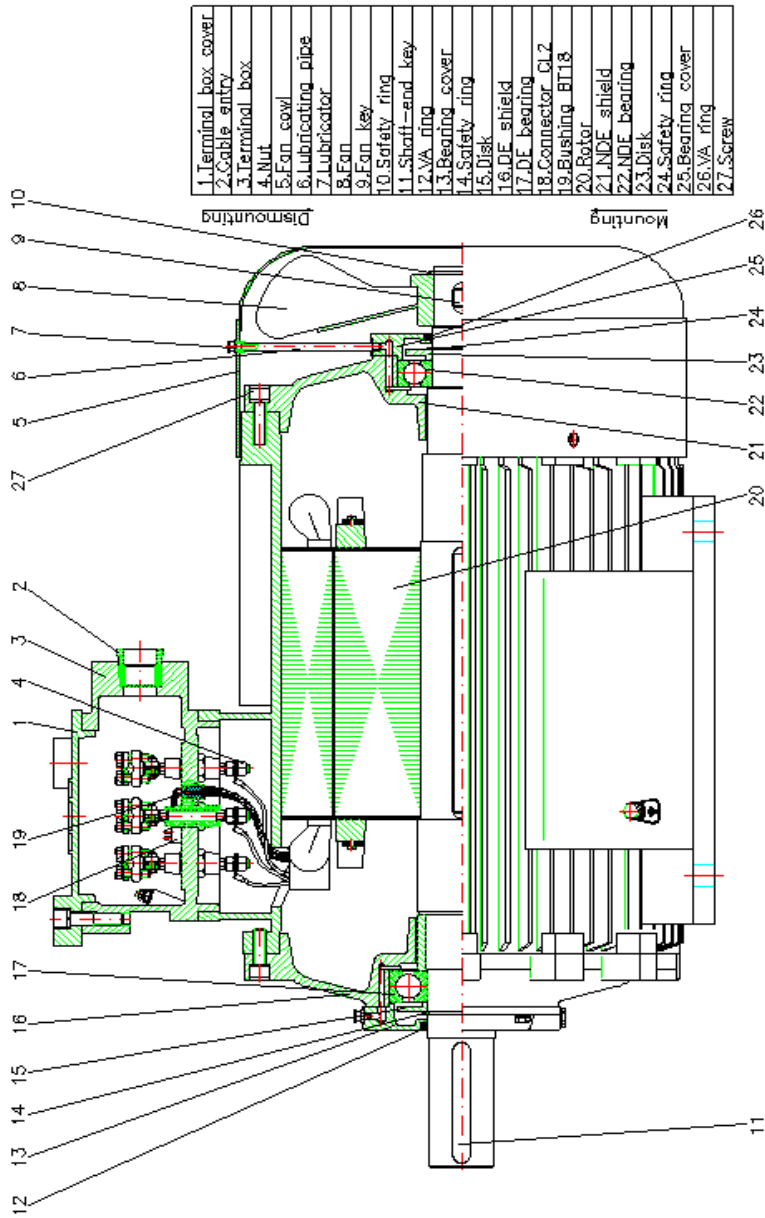
Frame size 180-250

Fig.2



Frame size 280 - 315

Fig.3



<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 22 / 32
		Revision 3

### Annex 3

#### Performance data

Motor type	Pn kW	Nn Rpm	$\eta$ %	cos $\phi$	Ia/In	Ma/Mn	Mk/Mn	J Kgm <sup>2</sup>	L <sub>PA</sub> dB(A)	Weight kg
<b>2 poles 2p=2</b>										
ASA 63a-2	0,18	2630	63,6	0,75	3,5	3,1	3,1	0,00014	56	11
ASA 63b-2	0,25	2685	67,8	0,77	3,8	3,1	3,1	0,00018	56	12
ASA 71a-2	0,37	2700	71,2	0,8	3,4	2,4	2,4	0,00062	66	16
ASA 71b-2	0,55	2790	72	0,82	3,7	2,7	2,7	0,00085	69	17
ASA 80a-2	0,75	2700	75	0,84	4,5	2,3	2,6	0,00125	62	21
ASA 80b-2	1,1	2700	76,6	0,85	4,5	2,5	2,6	0,00133	62	24
ASA 90S-2	1,5	2675	78,5	0,84	5	2,5	2,5	0,00259	67	30
ASA 90L-2	2,2	2800	81,5	0,85	5	2,8	2,8	0,00318	67	36
ASA 100L-2	3	2825	83,6	0,89	5,5	3,1	3,3	0,0053	74	44
ASA 112M-2	4	2850	86,1	0,85	6,2	3,1	3,1	0,00744	72	65
ASA 132Sa-2	5,5	2860	86,1	0,85	6,45	3,2	3,2	0,01538	75	85
ASA 132Sb-2	7,5	2850	87,12	0,87	6,8	3,1	3,2	0,02097	78	88,5
ASA 160Ma-2	11	2925	88,7	0,88	7	2,3	2,4	0,03267	83	133
ASA 160Mb-2	15	2925	89,81	0,86	7	2,2	2,4	0,04155	84	172
ASA 160L-2	18,5	2925	90,5	0,86	7	2,3	2,5	0,05043	84	191
ASA 180M-2	22	2925	90,8	0,89	7,5	2,6	2,8	0,0959	86	212
ASA 200La-2	30	2925	91,5	0,91	7	2,4	2,7	0,15335	86	275
ASA 200Lb-2	37	2925	92,2	0,9	6,7	2,2	2,8	0,16952	86	290
ASA 225M-2	45	2925	92,85	0,89	7	2	2,5	0,24606	86	360
ASA 250M-2	55	2940	93,25	0,91	7	2,4	2,45	0,32111	86	435
ASA 280S-2	75	2960	94	0,9	7,1	2,3	2,4	0,54955	88	630
ASA 280M-2	90	2960	93,92	0,9	7,1	2	2,25	0,61098	92	680
ASA 315S-2	110	2960	94,2	0,91	7,5	2,1	2,6	1,03957	94	850
ASA 315M-2	132	2960	94,5	0,91	7,5	2,1	2,2	1,28301	95	925
ASA 315MX-2	160	2975	94,8	0,9	7,5	2,3	2,4	1,93200	95	1170
ASA 315LY-2	200	2975	94,69	0,9	7,5	2,3	2,4	2,17094	95	1270
<b>4 poles 2p=4</b>										
ASA 63a-4	0,12	1295	62,7	0,69	3	2,4	2,4	0,00021	59	12
ASA 63b-4	0,18	1305	63,5	0,7	3,3	2,7	2,7	0,00027	61	13
ASA 71a-4	0,25	1420	67,3	0,7	4,1	2,4	2,7	0,00089	62	15
ASA 71b-4	0,37	1360	71,6	0,71	3,5	2,6	2,6	0,00122	62	16,5
ASA 80a-4	0,55	1400	72,1	0,71	4,5	2,3	2,6	0,00178	62	22,5
ASA 80b-4	0,75	1360	74,66	0,72	4	2,3	2,6	0,00223	62	23
ASA 90S-4	1,1	1395	76,8	0,75	4,7	2,7	2,6	0,00383	60	32
ASA 90L-4	1,5	1400	78,8	0,79	4,6	2,3	2,5	0,00504	59	36
ASA 100La-4	2,2	1420	81,1	0,79	5	2,5	2,6	0,00718	68	42
ASA 100Lb-4	3	1410	83	0,81	4,8	2,5	2,6	0,00989	67	48
ASA 112M-4	4	1420	85	0,86	5,8	2,6	2,8	0,01506	67	67

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 23 / 32
		Revision 3

Motor type	Pn kW	Nn Rpm	$\eta$ %	cos $\phi$	Ia/In	Ma/Mn	Mk/Mn	J Kg $m^2$	L <sub>PA</sub> dB(A)	Weight kg
ASA 132S-4	5,5	1445	87	0,83	6	2,5	2,7	0,03298	64	90
ASA 132M-4	7,5	1455	87,5	0,84	6,5	2,1	2,3	0,04459	67	112
ASA 160M-4	11	1450	88,7	0,88	6,3	2,2	2,4	0,07376	67	145
ASA 160L-4	15	1450	89,5	0,88	6,5	2,3	2,4	0,09395	69	170
ASA 180M-4	18,5	1450	90,5	0,87	6	2	2,4	0,15058	77	190
ASA 180L-4	22	1460	91	0,86	6,2	2	2,3	0,16676	79	234
ASA 200L-4	30	1460	91,5	0,87	7	2	2,6	0,25429	79	310
ASA 225S-4	37	1460	92,5	0,88	7	2	2,6	0,38739	79	360
ASA 225M-4	45	1460	93	0,88	7,4	2	2,4	0,45649	82	370
ASA 250M-4	55	1460	93,3	0,88	7,1	2,5	2,6	0,57024	82	460
ASA 280S-4	75	1470	93,8	0,91	7,25	2,4	2,4	0,93753	82	690
ASA 280M-4	90	1470	94,1	0,89	7	1,9	2	1,06163	89	750
ASA 315S-4	110	1470	94,3	0,91	7,1	2,1	2,2	1,64532	85	850
ASA 315M-4	132	1470	94,54	0,90	7	2,3	2,3	1,83922	81	925
ASA 315MX-4	160	1480	94,7	0,87	6,5	2,1	2,2	3,30965	92	1150
ASA 315LZ-4	200	1480	95,21	0,88	6,5	2,1	2,2	4,12174	92	1315

**6 poles 2p=6**

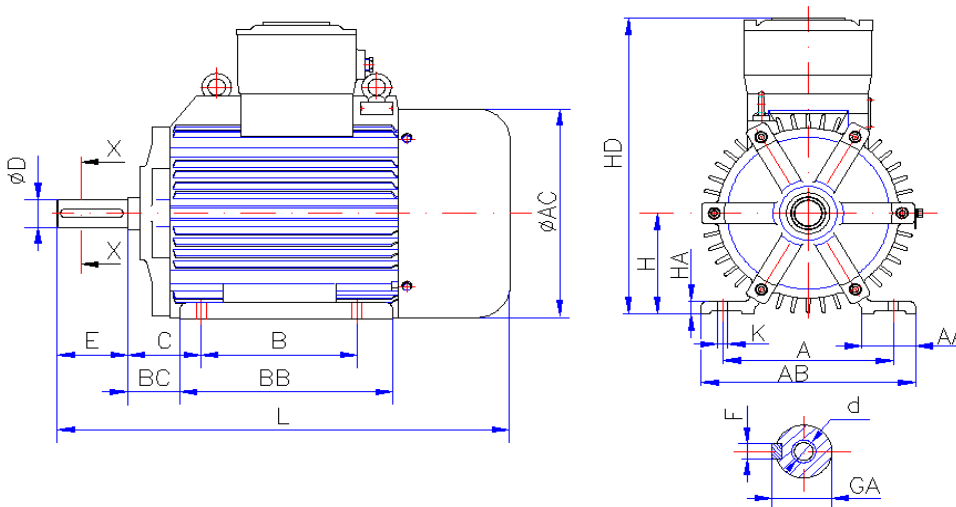
ASA 71a-6	0,18	895	61	0,74	3,2	2,3	2,4	0,00175	53	15
ASA 71b-6	0,25	910	65,5	0,72	3,6	2,5	2,7	0,00221	45	16
ASA 80a-6	0,37	910	67	0,73	3,6	2	2,5	0,00282	48	22
ASA 80b-6	0,55	910	68,5	0,7	4	2,2	2,3	0,00399	58	24
ASA 90S-6	0,75	910	71,5	0,76	3,2	2	3,4	0,00578	56	30
ASA 90L-6	1,1	910	74	0,76	4	2,4	2,6	0,00764	60	33
ASA 100Lb-6	1,5	955	77	0,76	4,6	1,9	2,2	0,01239	67	42
ASA 112M-6	2,2	960	79	0,76	5,7	2,2	2,3	0,02157	63	57
ASA 132S-6	3	954	81	0,77	5,3	2,7	2,9	0,0361	65	103
ASA 132Ma-6	4	945	84	0,78	5,5	2,1	2,2	0,04984	66	106
ASA 132Mb-6	5,5	955	86,5	0,8	6	2,4	2,6	0,07128	57	115
ASA 160M-6	7,5	960	88	0,79	6,5	2	2,1	0,1082	65	145
ASA 160L-6	11	960	88,5	0,79	6,5	1,9	2	0,14863	67	190
ASA 180L-6	15	960	89	0,8	6,5	1,8	2	0,25152	73	242
ASA 200La-6	18,5	960	90,5	0,8	6,7	2	2,5	0,36314	73	300
ASA 200Lb-6	22	960	91,73	0,82	6,2	2	2,3	0,45198	76	330
ASA 225M-6	30	965	91,41	0,84	6,9	1,8	2,4	0,68931	76	380
ASA 250M-6	37	975	92,01	0,85	7,2	2,7	2,7	0,85997	76	400
ASA 280S-6	45	975	92	0,86	6,2	1,9	2	1,42072	74	560
ASA 280M-6	55	980	92,2	0,86	6,7	2	2,1	1,61384	76	650
ASA 315S-6	75	980	92,78	0,87	7,3	2,4	2,5	2,71489	72	850
ASA 315M-6	90	985	93,5	0,88	7,5	2,3	2,4	3,04248	88	925
ASA 315MX-6	110	985	93,96	0,85	6,5	2	2,2	5,25397	83	1110
ASA 315LX-6	132	985	94,2	0,86	6,5	2	2,2	5,25397	83	1110
ASA 315LY-6	160	985	94,5	0,86	6,5	2	2,2	5,90525	89	1210

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 24 / 32
		Revision 3

Motor type	Pn kW	Nn Rpm	$\eta$ %	cos $\phi$	Ia/In	Ma/Mn	Mk/Mn	J Kgm <sup>2</sup>	L <sub>PA</sub> dB(A)	Weight kg
<b>8 poles 2p=8</b>										
ASA 71 -8	0,09	630	50	0,58	2,9	3	3,3	0,00221	41	16
ASA 80a -8	0,18	660	53	0,61	2,9	3,1	3,3	0,00282	46	22
ASA 80b -8	0,25	670	62	0,64	3	3,2	3,3	0,00399	46	24
ASA 90S -8	0,37	680	66	0,63	3	2,9	3,1	0,00578	50	31
ASA 90L -8	0,55	690	67	0,69	3,3	2,8	3	0,00764	50	34
ASA 100La-8	0,75	700	70	0,69	3,8	2	2,3	0,01116	61	40
ASA 100Lb-8	1,1	705	72,4	0,68	4,1	2	2,3	0,01542	59	44
ASA 112M -8	1,5	725	74,7	0,71	4,5	1,4	1,9	0,02157	60	58
ASA 132S -8	2,2	710	78,5	0,71	5,17	1,76	2,13	0,03999	62	95
ASA 132M -8	3	712	82	0,73	5,84	1,8	1,84	0,05569	63	109
ASA 160Ma-8	4	720	82	0,69	4,5	1,95	2	0,09365	63	115
ASA 160Mb-8	5,5	720	84	0,7	5,2	2,1	2,2	0,13246	66	150
ASA 160L -8	7,5	720	85	0,7	5	2	2,1	0,14863	67	186
ASA 180L -8	11	720	86	0,76	5	1,8	1,9	0,25152	68	240
ASA 200L -8	15	720	89,1	0,79	5,2	2	2,3	0,45198	70	320
ASA 225S -8	18,5	720	90,1	0,81	6,5	1,8	2,2	0,58399	71	345
ASA 225M -8	22	720	91	0,82	6,5	1,8	2	0,68931	72	350
ASA 250M -8	30	730	91	0,81	6,5	2,2	2,3	0,85997	72	465
ASA 280S -8	37	730	91	0,8	4,9	1,8	1,9	1,42072	72	665
ASA 280M -8	45	730	92	0,8	6,2	2,1	2,5	1,61384	73	720
ASA 315S -8	55	730	92,5	0,81	5,9	1,8	1,9	2,71489	79	850
ASA 315M -8	75	735	93	0,82	5,5	1,8	2	3,04248	82	925
ASA 315MX-8	90	735	93,1	0,77	5,9	1,8	2	5,25397	82	1110
ASA 315LY-8	110	735	93,3	0,78	5,9	1,8	2	5,90525	85	1200
ASA 315LZ-8	132	735	93,5	0,78	5,5	1,8	2	5,90525	85	1200



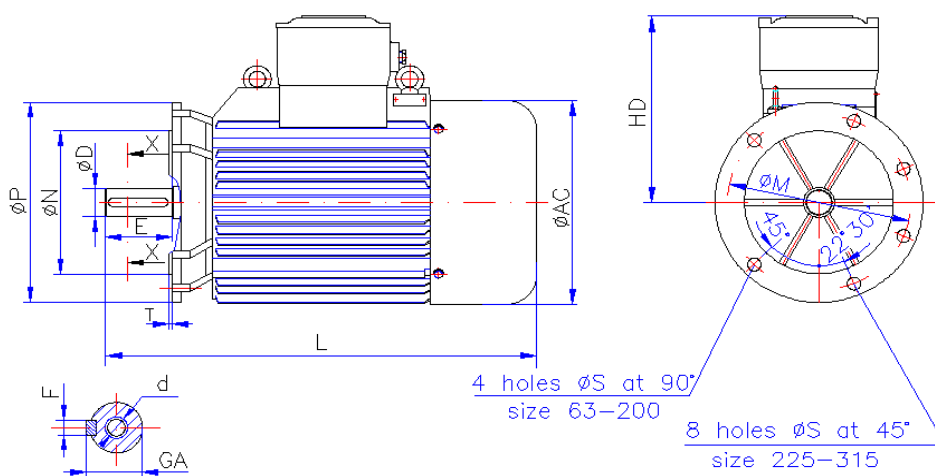
**Annex 4**  
**Overall and mounting dimensions for motors type ASA frame sizes 63-315**  
**Type of construction IM 1001**



**Table 1**

Frame size	A	B	C	H	K	D			E		F h9		GA		d	AA	AB	BB	BC	HA	AC	HD	L				
						nom.	tol.	2p=2	2p>2	2p=2	2p>2	2p=2	2p>2	2p=2									2p>2	2p=2	2p>2	2p=2	2p>2
						2p=2																					
63	100	80	40	63	7	11	j6	23	4	12,5	M4	31	131	104	28,5	9	125	197	259								
71	112	90	45	71	7	14	j6	30	5	16	M5	37	141	125	33	9	140	222	295								
80	125	100	50	80	10	19	j6	40	6	21,5	M6	35	160	152	35,5	12	158	252	315								
90S	140	100	56	90	10	24	j6	50	8	27	M8	40	180	147	39,5	13	177	268	363								
90L	140	125	56	90	10	24	j6	50	8	27	M8	40	180	172	39,5	13	177	268	363								
100LW	160	140	63	100	12	28	j6	60	8	31	M10	45	200	180	43	14	199	305	412								
100LX	160	140	63	100	12	28	j6	60	8	31	M10	45	200	200	43	14	199	305	437								
112M	190	140	70	112	12	28	j6	60	8	31	M10	45	224	200	50	15	221	328	456								
132S	216	140	89	132	12	38	k6	80	10	41	M12	60	264	200	69	19	263	395	523								
132M	216	178	89	132	12	38	k6	80	10	41	M12	60	264	250	69	19	263	395	570								
160M	254	210	108	160	14,5	42	k6	110	12	45	M16	80	320	300	63	20	317	470	660								
160L	254	254	108	160	14,5	42	k6	110	12	45	M16	80	320	300	63	20	317	470	660								
180M	279	241	121	180	14,5	48	k6	110	14	51,5	M16	80	360	340	71	25	357	520	730								
180L	279	279	121	180	14,5	48	k6	110	14	51,5	M16	80	360	340	71	25	357	520	730								
200L	318	305	133	200	18,5	55	m6	110	16	59	M20	82	400	380	95	25	396	573	800								
225S	356	286	149	225	18,5	55	60	m6	-	140	-	18	-	64	M20	100	440	430	114	20	446	635	-	915			
225M	356	311	149	225	18,5	55	60	m6	110	140	16	18	59	64	M20	100	440	430	114	20	446	635	885	915			
250M	406	349	168	250	24	60	65	m6	140	140	18	18	64	69	M20	120	500	480	114	20	446	660	965	965			
280S	457	368	190	280	24	65	75	m6	140	140	18	20	69	79,5	M20	120	550	460	147	18	500	756	1036	1036			
280M	457	419	190	280	24	65	75	m6	140	140	18	20	69	79,5	M20	120	550	500	147	18	500	756	1076	1076			
315S	508	406	216	315	28	65	80	m6	140	170	18	22	69	85	M20	130	630	528	151,5	27	560	826	1149	1179			
315M	508	457	216	315	28	65	80	m6	140	170	18	22	69	85	M20	130	630	568	151,5	27	560	826	1189	1219			
315MX	508	457	216	315	28	65	80	m6	140	170	18	22	69	85	M20	120	626	588	176	27	620	857	1220	1280			
315LY	508	508	216	315	28	65	80	m6	140	170	18	22	69	85	M20	120	626	588	176	27	620	857	1290	1350			
315LZ	508	508	216	315	28	65	80	m6	140	170	18	22	69	85	M20	120	626	588	176	27	620	857	-	1350			

**Overall and mounting dimensions for motors type ASA frame sizes 63-315  
Type of construction IM 3001**



**Table 2**

Frame size	M	N	P	S	T	D		E		F h9		GA		d	AC	HD	L		
						nom.	tol.	2p=2	2p>2	2p=2	2p>2	2p=2	2p>2				2p=2	2p>2	
63	115	95	140	10	3	11	J6	23	4	12,5	M4	125	134	259					
71	130	110	160	10	3,5	14	j6	30	5	16	M5	140	151	295					
80	165	130	200	12	3,5	19	j6	40	6	21,5	M6	158	172	315					
90S	165	130	200	12	3,5	24	j6	50	8	27	M8	177	178	363					
90L	165	130	200	12	3,5	24	j6	50	8	27	M8	177	178	363					
100LW	215	180	250	14,5	4	28	j6	60	8	31	M10	199	205	412					
100LX	215	180	250	14,5	4	28	j6	60	8	31	M10	199	205	437					
112M	215	180	250	14,5	4	28	j6	60	8	31	M10	221	216	456					
132S	265	230	300	14,5	4	38	k6	80	10	41	M12	263	263	523					
132M	265	230	300	14,5	4	38	k6	80	10	41	M12	263	263	570					
160M	300	250	350	18,5	5	42	k6	110	12	45	M16	317	310	660					
160L	300	250	350	18,5	5	42	k6	110	12	45	M16	317	310	660					
180M	300	250	350	18,5	5	48	k6	110	14	51,5	M16	357	340	730					
180L	300	250	350	18,5	5	48	k6	110	14	51,5	M16	357	340	730					
200L	350	300	400	18,5	5	55	m6	110	16	59	M20	396	373	800					
225S	400	350	450	18,5	5	-	60	m6	-	140	-	18	-	64	M20	446	410	-	915
225M	400	350	450	18,5	5	55	60	m6	110	140	16	18	59	64	M20	446	410	885	915
250M	500	450	550	18,5	5	60	65	m6	140	140	18	18	64	69	M20	446	410	965	965
280S	500	450	550	18,5	5	65	75	m6	140	140	18	20	69	79,5	M20	500	476	1036	1036
280M	500	450	550	18,5	5	65	75	m6	140	140	18	20	69	79,5	M20	500	476	1076	1076
315S	600	550	660	24	6	65	80	m6	140	170	18	22	69	85	M20	560	511	1149	1179
315M	600	550	660	24	6	65	80	m6	140	170	18	22	69	85	M20	560	511	1189	1219
315MX	600	550	660	24	6	65	80	m6	140	170	18	22	69	85	M20	620	857	1220	1280
315LY	600	550	660	24	6	65	80	m6	140	170	18	22	69	85	M20	620	857	1290	1350
315LZ	600	550	660	24	6	65	80	m6	140	170	18	22	69	85	M20	620	857	-	1350

**Annex 5**

**The permissible radial forces on the shaft end for 20.000 hours bearings life**

Frame size	Poles No.	Fr [N]	Frame size	Poles No.	Fr [N]	Frame size	Poles No.	Fr [N]
<b>63</b>	2p=2	240	<b>112</b>	2p=2	800	<b>225</b>	2p=2	3360
	2p=4	270		2p=4	940		2p=4	4200
				2p=6	1030		2p=6	4520
				2p=8	1150		2p=8	4700
<b>71</b>	2p=2	305	<b>132</b>	2p=2	1290	<b>250</b>	2p=2	3360
	2p=4	395		2p=4	1480		2p=4	4830
	2p=6	435		2p=6	1600		2p=6	5200
	2p=8	520		2p=8	1760		2p=8	5550
<b>80</b>	2p=2	480	<b>160</b>	2p=2	2250	<b>280</b>	2p=2	5060
	2p=4	610		2p=4	2800		2p=4	7100
	2p=6	645		2p=6	3150		2p=6	7900
	2p=8	708		2p=8	3600		2p=8	8650
<b>90</b>	2p=2	530	<b>180</b>	2p=2	2600	<b>315</b>	2p=2	6100
	2p=4	690		2p=4	3200		2p=4	9300
	2p=6	740		2p=6	3700		2p=6	10500
	2p=8	820		2p=8	4150		2p=8	11200
<b>100</b>	2p=2	655	<b>200</b>	2p=2	2970	<b>315M/L</b>	2p=2	6000
	2p=4	828		2p=4	3740		2p=4	9500
	2p=6	905		2p=6	4130		2p=6	10900
	2p=8	1025		2p=8	4415		2p=8	12300

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 28 / 32 Revision 3

## Annex 6

### ALUMINUM BASE GREASES LUBRICERP AR90 AI 1, LUBRICERP AR 95 AI 3

#### 1. GENERAL INFORMATION

##### Scope

The present document refers to greases containing aluminium stearate and mineral oil.

##### 2.1 Use

The products are used, upon prescription, as anticorrosion protection and lubrication materials for certain mechanisms.  
Temperature range: -30°C up to +80°C.

#### 2. TECHNICAL QUALITY CONDITIONS

Characteristic denomination	Admissibility conditions		Determination method (standard)
	AR 90 AI 1	AR 95 AI 3	
Aspect, color	Homogeneous grease, color yellow-brown		visual
Dripping point °C	min.90	min.95	37
Penetration at 25°C, after 60 mixings, 1/10 mm	305...345	215...255	2392
Resistance to water action after 5 hours at 50°	good		8044
Corrosive action on metal: steel, copper, brass, 24 h at 50°C	Non-corrosive		8206

#### 3. RULES FOR QUALITY CHECKING

- 3.1 Quality checking is made on batches through analyses (according to paragraph 2). The dimension of the sample batch is maximum 400 kg.  
The product must comply with the technical quality conditions as stipulated in paragraph 2. In case on non observance the sample batch is rejected.
- 3.2 Sampling and preparation of the samples for quality verification is made according to STAS 41.

#### 4. PACKING, MARKING, TRANSPORT, HANDLING, DOCUMENTS

- 4.1 Packing of the products is made in barrels with removable lids of 60 l and 200 l capacity, according to STAS 4225.  
The product must be handled attentively, to avoid the contamination.
- 4.2 Upon delivery, a Declaration of Conformity will accompany each batch.

## Annex 7

### LIST OF SPARE PARTS

#### 1. Ball bearings

Frame size	Drive end		Non drive end	
	2p = 2	2p = 4, 6, 8	2p = 2, 4, 6, 8	
<b>63</b>	6202 2Z P6 EL		6202 2Z P6 EL	
<b>71</b>	6203 2Z P6 EL		6203 2Z P6 EL	
<b>80</b>	6304 2Z P6 EL		6304 2Z P6 EL	
<b>90</b>	6305 2Z P6 EL		6305 2Z P6 EL	
<b>100</b>	6306 2Z P6 EL		6306 2Z P6 EL	
<b>112</b>	6307 2Z P6 EL		6307 2Z P6 EL	
<b>132</b>	6308 2Z P6 EL		6308 2Z P6 EL	
<b>160</b>	6310 2Z P6 EL		6310 2Z P6 EL	
<b>180</b>	6311 2Z P6 EL		6311 2Z P6 EL	
<b>200</b>	6312 2Z P6 EL		6312 2Z P6 EL	
<b>225</b>	6313 2Z P6 EL		6313 2Z P6 EL	
<b>250</b>	6313 2Z P6 EL	6314 2Z P6 EL	6313 2Z P6 EL	
<b>280</b>	6314 P6 EL	6316 P6 EL	6314 P6 EL	
<b>315</b>	6315 P6 EL	6317 P6 EL	6315 P6 EL	
<b>315M/L</b>	6316 MP6 EL	6319 P6 EL	6316 MP6 EL	6319 P6 EL

#### 2. Terminal plate part and bushings size

Motor type	Terminal plate size	Bushing size
63	M4	-
71		
80	-	M4
90		
100	-	M5
112		
132	-	M6
160		
180	-	M8
200		
225	-	M10
250		
280	-	M12
315SM/ML		

**3.Gland piece**

Size	Gland size	Sealing ring size
63	IPE16	20x11
71		
80		
90		
100	IPE 21	26x10
		26x13
112		26x16
		26x19
132	IPE 29	35x18
160		35x21
180		35x24
		35x27
200	IPE 36	45x24
		45x27
225		45x30
		45x33
250	IPE 42	52x30
		52x33
280		52x36
		52x39
315SM/ML	IPE 48	57x36
		57x39
		57x42
		57x45

<b>SC UMEB SA</b>	Three-phase squirrel cage induction motors in flameproof enclosure type ASA frame size 63 - 315	CT1- 2006
		Page 31 / 32 Revision 3

Size	Gland size	Sealing ring size
63	M25x1.5	23x11
71		
80		
90		
100	M32x1.5	30x10
112		30x13
		30x16
		30x19
132	M32x1.5	30x16
160	M40x1.5	30x18
		30x21
		38x18
180		38x21
200-225	M50x1.5	38x24
		48x24
		48x27
		48x30
225-250	M63x1.5	48x36
250		61x30
280	M63x1.5	61x36
315SM / ML		61x42
		61x45
Optional for prot. devices	M20x1.5	18x11

**Remarks :**

- At user request, other parts and pieces could be offered as spare parts
- Any request of spare parts has to indicate the type, power and speed of the motor
- UMEB-SA recommends to be used only original spare parts for a good motor operation
- UMEB-SA provides service and repairs of its motors with original spare parts during guarantee period according to the normes into force. UMEB-SA can also provide motor repairs after guarantee period

Anexa 8

