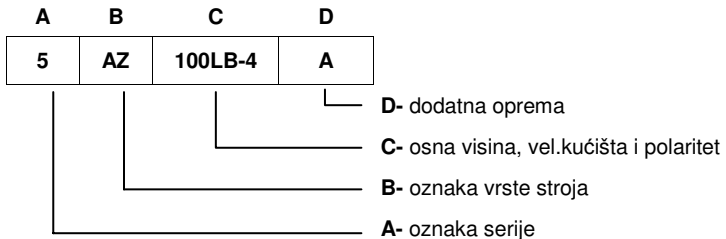


1. OPĆENITO

Ove osnovne upute odnose se na **EN/IEC kataloške** niskonaponske asinkrone kavezne elektromotore potpuno zatvorene izvedbe (stupnja zaštite IP54 ili viših prema IEC 60034-5), orebrenog kućišta, hlađenih vanjskim vlastitim ventilatorom smještenim ispod ventilatorske kape (način hlađenja IC 411 prema IEC 60034-6), u veličinama 56 – 315, odnosno zaštićene izvedbe (stupnja zaštite IP23 prema IEC 60034-5), glatkog kućišta, hlađenih unutarnjim vlastitim ventilatorom smještenim ispod stražnjeg ležajnog štita (IC 01 prema IEC 60034-6), u veličinama 180 - 250. Serije, izvedbe i vrste mogu se odrediti iz tipne oznake motora.

Tipna oznaka sastoji se iz skupine slova i brojki čije je značenje određeno internim torničkim standardom.



Oznaka serije (oznaka A) :

- 5 serija motora izvedenih u siluminskom kućištu (za oblik B3 s odlivenim nogama)
- 6 serija motora izvedenih u siluminskom kućištu (za oblik B3 s montažnim nogama)
- 7 i 8 serija motora izvedenih u kućištu od lijevanog željeza (za oblik B3 s montažnim nogama)

Oznaka vrste stroja (oznaka B) :

- AZ asinkroni zatvoreni motor
- AZA motori s razlikom u mehaničkoj izvedbi
- ABZ motori brodske izvedbe
- AZC jednofazni motori s kondenzatorom za trajni rad
- AZCD jednofazni motori s kondenzatorom za trajni rad i zaletnim kondenzatorom
- AZCG jednofazni generatori
- AZCJ jednofazni motori sa zaletnim kondenzatorom
- AZCS motori u Steinmetz spoju
- AZD motori za dizalične pogone
- AZE motori s električnom razlikom u odnosu na osnovnu izvedbu
- AZG asinkroni generatori
- AZH motori povećane snage
- AZK motori s prigrađenom elektromagnetskom kočnicom
- AZN motori u protueksplozijskoj zaštiti " Nepaleći uređaji za zonu 2- bez prekida strujnog kruga - EExn A "
- AZP višebrzinski motori s konstantnim momentom na svim brzinama
- AZPV višebrzinski motori za ventilatorske pogone
- AZS motori u protueksplozijskoj zaštiti " Povećana sigurnost – Ex e "
- AT motori u protueksplozijskoj zaštiti " oklapanje Ex d i Ex de "
- AZV motori za ventilatorske pogone sa specijalnom izvedbom namota
- AO otvoreni (zaštićeni motori)
- AOG trofazni otvoreni (zaštićeni) generatori
- ABO otvoreni (zaštićeni) motori brodske izvedbe

Oznaka C sadrži slijedeće značenje :

56 – 315	osna visina
S, M, L	duljina kućišta
A, B, C	duljina aktivnog dijela unutar iste duljine kućišta
2, 4, 6/4,..	polaritet motora

Oznaka dodatne opreme ili izvedbe stroja (oznaka D) :

A	motor s ugrađenim grijačima namota
G	motor s prigradenim inkrementalnim davačem
K	motor s priključnim kabelom
S	motor s prigradenom sklopkom
T	motor s ugrađenom termičkom zaštitom
V	motor s prisilnom ventilacijom
Z	motor sa zalivenim statorskim namotom

Motori se u osnovnoj izvedbi izvode u stupnju zaštite **IP 55/**. Ova zaštita štiti osobe od dodira dijelova pod naponom i od pokretnih unutarnjih dijelova, od štetnog taloženja prašine i mlaza vode iz svih smjerova. Stupanj zaštite definiran je na natpisnoj pločici motora te o tome treba voditi brigu kod postavljanja motora u radni položaj. Motori mogu biti izvedeni i u drugim stupnjevima zaštite, najčešće **IP65, IP56 i IP66**.

2. PRIJEVOZ I SKLADIŠTENJE

Motori trebaju biti prevoženi sredstvima i na načine koji isključuju moguća oštećenja, tj. pozicionirani onako kako su smješteni u osnovno i originalno transportno pakiranje. Preporuča se skladištenje u suhom i natkritom prostoru daleko od mogućih korozivnih ugroza. U slučaju duljeg skladištenja potrebno je rukom barem jednom godišnje okrenuti rotor za puni okret. Ukoliko je od isporuke prošlo više od 3 godine, a motori nisu stavljeni u rad, potrebno je zamijeniti ležajeve ili ako su isti za doknadno podmazivanje postupiti kako je opisano u toč. 6.

Rukovanje motorima u skladištu treba obavljati na pravilan način koristeći predviđene vijčane karike ili paletni sustav.

3. POSTAVLJANJE U RADNI POLOŽAJ

Motori s nogama trebaju biti postavljeni na čvrstu podlogu adekvatno svojoj veličini i zahtjevima oblika IEC 60034-7 te pričvršćeni vijcima. Prirubni motori pričvršćuju se vijcima direktno na protuprirubnicu uređaja kojeg pogone.

Neposredno prije postavljanja ukloniti zaštitni tuljak pogonskog vratila.

Motori moraju biti smješteni tako da imaju dovoljno prostora za ventilaciju i odvod topline. Minimalna udaljenost usisa na ventilatorskoj kapi ili usisnoj/ispusnoj žaluziji do neke prepreke ne smije biti manja od nazivne osne visine motora u mm.

Standardno su motori predviđeni za vanjsko i unutarnje postavljanje, rad u okolini umjerene vlažnosti i niske korozivne agresivnosti u temperaturnom području -20 do +40° C do 1000 m nadmorske visine, odnosno postavljanje u zatvorenom i čistom prostoru, (motori tipne oznake AO, ABO).

Ukoliko su narušeni uvjeti hlađenja zbog povećane temperature okoline ili povećanja nadmorske visine, tada snagu motora treba korigirati prema tablici:

Temperatura rashladnog zraka	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
Snaga motora u % nazivne snage	100%	100%	100%	96%	91%	86%	80%

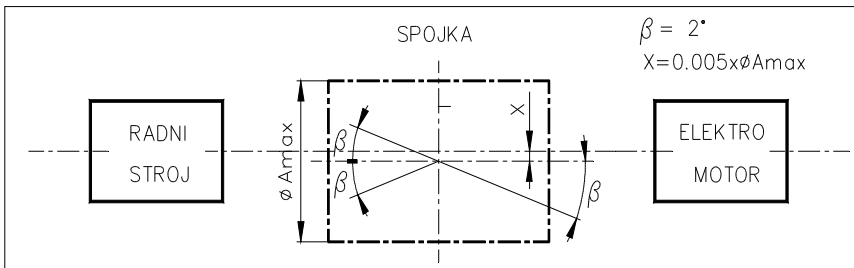
Nadmorska visina (m)	2000	3000	4000
Snaga motora u % nazivne pri temperaturi zraka 40°C	92%	84%	78%
Nazivna snaga motora pri temperaturi rashl. zraka	32°C	24°C	16°C

Motri izvedeni sa zaštitom namota za tropske uvjete rada imaju na sebi oznaku " TROPICALIZED ".

Prije svakog postavljanja motora treba provjeriti eventualna oštećenja motora odnosno moguće nepovoljne okolnosti smještaja koje mogu utjecati na pravilan rad.

Pri likom montaže na prijenosnik ili uređaj izbjegavati udarce i silu, pogotovo u smjeru pogonske osi motora, jer to može dovesti do oštećenja ležajeva, odnosno trajnog narušavanja zaštitnih sastava kod motora PEX-zaštite oklapanje "d". U slučaju potrebe zatražiti od proizvođača podatke o dopuštenim radijalnim i aksijalnim silama na pogonski kraj vratila odnosno motora ovisno o položaju ugradnje. Svi pričvrtni vijci moraju biti stegnuti odgovarajućim momentom kako bi se osigurao miran rad samog motora bez vibracija odnosno izvitoperenja ili prenaprežanja. Osigurati zaštitu tih vijaka od odvrtanja.

Kod prijenosa momenta krutim spojka treba osigurati propisanu suosnost s pogonskim vratilom pri ugradnji (prema skici), a kod remenskog prijenosa voditi računa o veličini naponske sile u remenu i njenoj okomitosti na pogonsko vratilo.



Rotori motora su dinamički izbalansirani s poluklinom prema ISO 8821 tako da i svi elementi koji se montiraju direktno na pogonsko vratilo motora trebaju biti dinamički izbalansirani na isti način.

4. SPAJANJE NA MREŽU I MJERE SIGURNOSTI / ZAŠTITE

Prije priključenja motora na mrežu posebnu pažnju treba posvetiti slijedećem :

- da li podaci na natpisnoj pločici motora odgovaraju naponu i frekvenciji mreže
- da li su priključci spojeni prema odgovarajućoj shemi spajanja priloženoj u priključnom ormariću motora odnosno prema podacima natpisne pločice i samoj mreži (u slučaju zahtjevanog starta motora pomoću Y/D preklopke moraju biti uklonjene spojnice s priključne pločice motora !)
- da li je zaštita od dijelova pod naponom provedena u skladu s lokalnim sigurnosnim propisima. Kabel uzemljenja treba spojiti na posebno označeno mjesto unutar priključnog ormarića, a motor treba uzemljiti i preko vijka za uzemljenje smještenog izvana na kućištu. Presjek vodiča uzemljenja mora biti veći ili jednak presjeku faznog vodiča. Stezaljke vanjskog uzemljenja su predviđene za vodič uzemljenja minimalnog presjeka 4 mm² (vel. do 180), odnosno 16 mm² (vel. 200 do 315)

- sve važeće sigurnosne procedure treba ispoštovati u skladu s primijenjenim sustavom zaštite od strujnog udara
- da unutar priključnog ormarića motora nema prljavštine, komadića spojnog materijala i sličnog
- da su svi priključci na priključnoj pločici motora čvrsto stegnuti. Max. momenti pritezanja iznose: M4 – 2Nm, M5 – 3,2Nm, M6 – 5Nm, M8 – 10Nm i M10 – 20Nm.
- da je energetski kabel (i eventualno kabeli pomoćnih strujnih krugova) odgovarajuće brtvljen na uvodnicama ormarića motora
- **da je provedena odgovarajuća zaštita od kratkog spoja i preopterećenja (osigurači, bimetalni releji, termička zaštita i sl.)**
- priključak elektromotora na mrežu treba izvesti s kablom odgovarajućih dimenzija i temperaturne postojanosti (za motore serije AT dodatni zahtjevi na kablove definirani su u "Izjavi proizvođača")

Na trofaznu mrežu napona 400V mogu se priključiti motori s podacima natpisne pločice D/Y 400/690 V i to u spoju trokut (D) prema priloženoj shemi spajanja u priključnom ormariću.

Na istu mrežu mogu se priključiti i motori s podacima natpisne pločice D/Y 230/400 V u spoju zvijezda (Y). Motori s tim podacima mogu se priključiti i na trofaznu mrežu napona 230 V, ali u spoju trokut (D).

Općenito, motori se priključuju na napojnu mrežu preko trolpolnog sklopnika ili trolpolnog zaštitnog prekidača.

Kod starta preko zvijezda - trokut (Y/D) preklopke spoj namota motora za nazivni napon mora biti trokut (D). U tom slučaju potezna struja iznosi 1/3 struje kod direktnog spajanja, ali isto tako i potezni moment pa o tome treba voditi računa, tj. tako startati samo rasterećene motore.

Dvobrzinski motori sa serijsko - paralelnu spojenim namotom (Dahlander spoj - odnos brzina 1 : 2), startaju se pomoću specijalnog prekidača. Spajanje na mrežu dvo i višebzinskih motora vrši se prema shemi spajanja priloženoj u priključnom ormariću motora uz odgovarajuću zaštitu, od kratkog spoja i preopterećenja.

Općenito, trofazni motori **KONČAR - MES d.d.** projektirani su prema zahtjevima norme IEC 60038 i mogu raditi bez problema s nazivnim vrijednostima snage i momenta uz odstupanje nazivnog napona mreže $\pm 10\%$, a jednofazni motori **KONČAR - MES d.d.** uz odstupanje nazivnog napona od $\pm 5\%$ i frekvencije $\pm 1\%$ od nazivne vrijednosti. Ukoliko je odstupanje napona veće, motor se ne smije opteretiti nazivnim momentom, već je isti potrebno korigirati proporcionalno smanjenju napona.

U pogonima gdje se motor pogoni iz statičkog pretvarača frekvencije (regulatora brzine vrtnje), primjenjuju se preporuke standarda IEC 60034-17, te o tome treba voditi računa kod izbora regulatora brzine vrtnje.

Poželjno je za napajanje motora koristiti pretvarač frekvencije (regulator brzine vrtnje) opremljen izlaznim dU/dt filterom radi osiguranja dužeg vijeka namota motora.

Kod takvog napajanja korisno je konzultirati proizvođača, vezano uz pogonske karakteristike motora i područje regulacije.

Ukoliko motor ima ugrađene antikonduzijske grijače, oni se spajaju prema dobivenoj uputi za spajanje i uključuju se u vremenu dok motor ne radi.

5. PROMJENA SMJERA VRTNJE I BROJ UKLAPANJA/REVERZIRANJA

Motori standardne izvedbe izvode se s desnim smjerom vrtnje gledano na pogonsku stranu vratila, a priključak je izveden prema priloženim uputama. Promjena smjera vrtnje obavlja se obično zamjenom redosljeda priključaka dviju faza napojne mreže.

Kod čestih promjena smjera vrtnje koristiti posebnu sklopku za reverziranje uz poštivanje dopuštenog broja reverziranja na sat za odnosni pogon i opterećenje (po potrebi konzultirati proizvođača). Isto vrijedi i za dopušteni broj uklopa (startanja), kako se ne bi termički preopteretio motor.

Promjena smjera vrtnje kod jednofaznih motora obavlja se zamjenom priključaka ili glavne ili pomoćne faze. Prije reverziranja rotor motora mora biti u mirovanju (u protivnom motor zadržava isti smjer vrtnje).

6. ODRŽAVANJE

Motri su konstruirani tako da im je održavanje lako i jednostavno. Ispravno instalirani i električki/termički dobro zaštićeni mogu raditi godinama.

Periodički ih treba izvata čistiti, a ukoliko rade u okolini gdje nečistoće mogu zatvoriti ventilacijske otvore na ventilatorskoj kapi ili ispuniti prostore između rebara za hlađenje iste treba ispuhati komprimiranim zrakom ili ukloniti četkom. Bilo koje odstupanje od nazivnih veličina odnosno nepravilan rad motora treba pomno istražiti po pitanju uzroka, (npr. povećana struja, porast temperature iznad dopuštene vrijednosti za deklariranu klasu izolacije, povećane vibracije, neobična buka, pojačan miris izolacije, aktiviranje motorske zaštite i sl.).

Ukoliko je isto uzrokovano motorom popravak treba izvršiti ovlašten i iskusan djelatnik. Za rezervne dijelove obratiti se na proizvođača te pri tom navesti tipsku oznaku motora i kodni broj s natpisne pločice motora (**vidi uputu za naručivanje**).

Ležajevi motora standardne ugradnje (2Z odnosno 2RS) su kuglični jednoredni, zračnosti C3 (motri serije 7AT 132 do 280 izvode se s ležajevima normalne zračnosti) i navedeni su u priloženoj tabeli. Podmazani su za vijek trajanja. Zamjena ležajeva u slučaju defekta, buke ili redovitog servisa vrši se propisanim alatima/napravama bez primjene sile i udara.

U slučaju ugradnje ležajeva s mogućnošću doknadnog podmazivanja razmaci podmazivanja dati su u priloženom dijagramu. Prilikom remonta takvi ležajevi se skinu na propisan način s vratila, dobro operu benzinom, osuše, navuku na vratilo na propisan način, podmažu odgovarajućom masti i to tako da se mašću ispuni cca 2/3 ležajnog prostora. Inače se podmazivanje može vršiti i za vrijeme pogona preko mazalica na ležajnim štitovima pomoću ručne pumpe za konzistentnu mast. Ovisno o veličini motora (najčešće 132-315) kod svakog podmazivanja treba utisnuti cca. 20 - 40 grama masti. Preporučene vrste masti su LIS-2 (INA), SHELL ALVANIA G3, ESSO UNIREX N3 odnosno sve one na bazi litijevih sapuna s temperaturom curenja kod 180-200 °C i opsegom uporabe od -20 do +150 °C.

	Veličina motora	Tip ležaja na obje strane za serije 5. i 7.	Tip ležaja na PS/SS za seriju 8.
Zatvorena izvedba	56	6201 – 2Z ili 2RS	
	63	6202 – 2Z ili 2RS	
	71	6203 – 2Z ili 2RS	
	80	6204 – 2Z ili 2RS	
	90	6205 – 2Z ili 2RS	
	100	6206 – 2Z ili 2RS	
	112	6306 – 2Z ili 2RS	
	132	6208 – 2Z ili 2RS	
	160	6309 – 2Z ili 2RS	
	180	6310 – 2Z ili 2RS	6311
	200	6312 – 2Z ili 2RS	2 pol: 6312 4 pol: NU 312 / 6312
225	6313 – 2Z ili 2RS	2 pol: 6313 4 pol: NU 313 / 6313	
250	6314 – 2Z ili 2RS	2 pol: 6315 4 pol: NU 315 / 6315	
280	6316 C3	2 pol: 6317 / 6314 4 pol: NU 317 / 63142 pol:	
315	6316 C3	6317 / 6317 4 pol: NU 319 / 6319	
Otvorena	180	6212 – 2Z ili 2RS	
	200	6213 – 2Z ili 2RS	

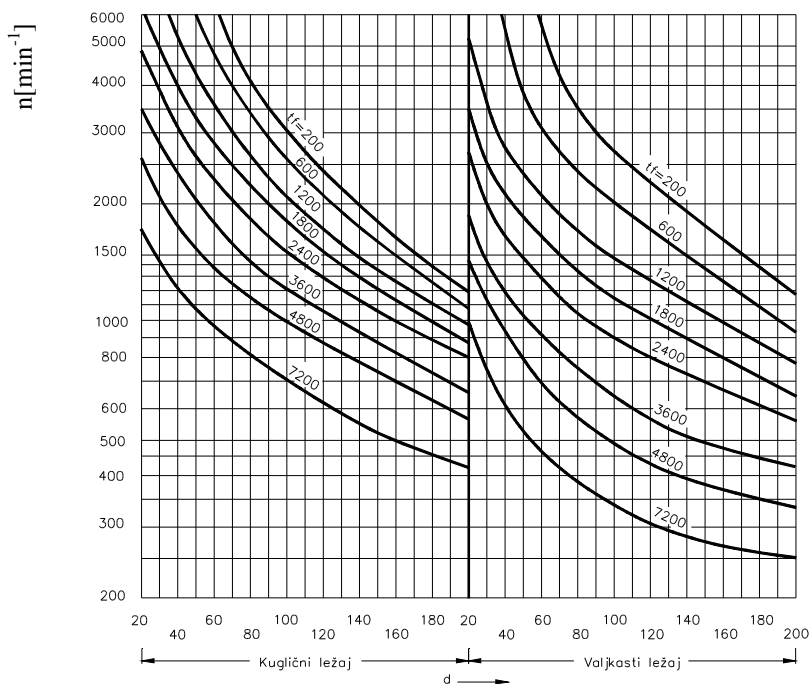
izvedba	225 250	6214 – 2Z ili 2RS 6216 – 2Z ili 2RS	
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Na veličine motora 132-315 na poseban zahtjev ugrađuju se i valjkasti jednodredni ležajevi serije NU.

Napomena :

- tablica vrijedi za sve polaritete jedno i višebrzinskih motora i sve položaje/oblike ugradnje prema IEC 60034-7 (EN60034-7)
- nominalni vijek trajanja ležajeva pod nazivnim uvjetima rada motora iznosi minimalno 40000 radnih sati za 4, 6 i 8 polne motora a minimalno 20000 radnih sati za dvopolne motore priključene na naponsku mrežu frekvencije 50Hz.

Dijagram za određivanje vremenskog razmaka kod doknadnog podmazivanja ležajeva



Primjer :

Kuglični ležaj serije 6208 unutarnjeg promjera 40 mm uz brzinu vrtnje 1500 min⁻¹ potrebno je podmazivati približno nakon svakih 6000 pogonskih sati - interpolacija).

d - unutarnji promjer ležaja (mm)



n - broj okretaja motora (min⁻¹)

t_r - vremenski razmak podmazivanja (sati pogona)

Prilikom svakog rastavljanja motora, preporučamo ugradnju novih osovinskih brtvila te brtvi kojima se osigurava stupanj zaštite motora.

7. OSNOVNO OZNAČAVANJE MOTORA IZ PROIZVODNOG PROGRAMA

Svaki motor iz proizvodnog programa opremljen je natpisnom pločicom na kojoj se nalaze osnovni podaci o proizvodu i deklarirani nazivni električki podaci za dotični proizvod.

<p>Osnovna motorska natpisna pločica</p>	 KONČAR ZAGREB Croatia KONČAR - MES d. d. Code N° ~ Type V Hz A kW cos φ rpm Ta °C Cl. IP IEC/EN 60034
<p>Osnovna motorska natpisna pločica za višenaponsko područje, natpisna pločica za S9 pogon motora Exd(e) u pogonu preko regulatora brzine vrtnje</p>	 KONČAR ZAGREB Croatia KONČAR - MES d. d. Code N° kg ~Mot Ta °C IC Cl. Rise IP Hz kW V A cos φ rpm © DE/NDE IEC 34, VDE0530

Na natpisnoj pločici nalaze se slijedeći podaci:

- Code:** Broj motora koji služi identifikaciji tijekom proizvodnog procesa, a u održavanju kao osnova za naručivanje rezervnih dijelova za dotični motor
- N:** Tvornički broj motora u kombinaciji s datumom izrade
- ~ :** Broj faza motora (1- jednofazni, 3 – trofazni)
- Tipaska:** Tipna oznaka motora prema objašnjenju iz uvodnog dijela ovih uputa u kombinaciji s oblikom ugradnje motora (B3, B5, B14 ...)
- V, Hz :** Napon i frekvencija naponske mreže i spoj za koji je motor izrađen, pri čemu daje svoje nazivne podatke ukoliko je opterećen nazivnom snagom definiranoj u rubrici **kW**
- A, min⁻¹, cos φ :** nazivni podaci koje motor daje kada je opterećen nazivnom snagom
- To :** Temperatura okoline za koju je motor izrađen pri kojoj smije biti opterećen nazivnom snagom
- Cl :** Izolacijski sustav primijenjen u motoru (F – najviša dopuštena temperatura 155°C, H – 180°C)
- IP :** Stupanj zaštite ostvaren kućištem i ležajnim štitovima s obzirom na štetan utjecaj vode i prašine
- S :** Vrsta pogona za koju je motor izrađen (S1 – S10)

- U preposljednji red natpisne pločice upisuju se podaci o ugrađenoj dodatnoj opremi
- Za jednofazne motore - upisuju se podaci o korištenim kondenzatorima za pokretanje i trajni rad,
 - kod motora s kočnicom – upisuju se podaci o nazivnom momentu kočnice i naponu kočnice,
 - kod PEX motora podaci o ugrađenim zaštitnim elementima (PTC..),
 - kod motora s grijačima – snaga i napon grijača,

- kod motora s prigradenim setom strane ventilacije – priključni napon i snaga ventilatora...

Kod motora opremljenih natpisnom pločicom za više naponsko područje ili se koristi kod EExd(e) motora za pogon preko regulatora brzine vrtnje (pogon S9), u rubrike se upisuju podaci na pojedinim brzinama vrtnje i pripadajućim nazivnim podacima.

Na takvim pločicama dodatno se još mogu naći podaci za :

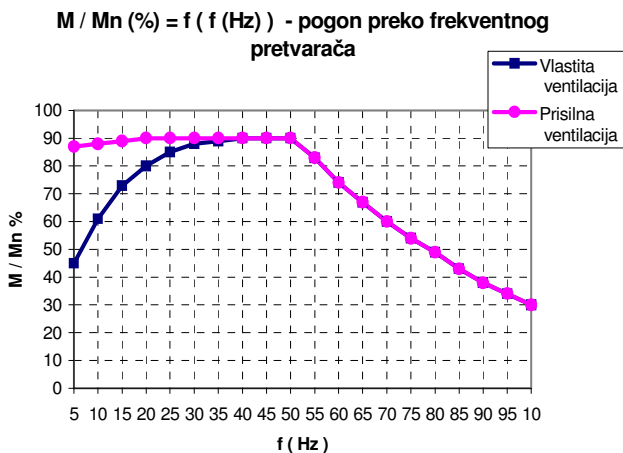
IC : način hlađenja motora (IC 411–vlastiti ventilator, IC 410 – bez ventilacije ...)

Rise : podatak o deklariranom zagrijavanju motora pri nazivnim podacima (B- 80K, F – 105K pri temperaturi okoline 40° C

DE/NDE: podaci o ugrađenom tipu ležaja

Serijski motor 5/6/7/8 je projektirana i ispitana u skladu s IEC 60034-1 (toč. 8.5 i 8.6) i može raditi preko frekventnog pretvarača u uvjetima u skladu s IEC 60034-17 u području regulacije od 5 do 60 Hz za polaritete motora $2p=2$, a za ostale polaritete u području regulacije od 5 do 100 Hz s opterećenjima prikazanim u grafikonu 1. Motori predviđeni za pogon preko frekventnog pretvarača u namotu imaju ugrađenu termičku zaštitu. Frekventni pretvarač se nalazi van zone opasnosti. Na dodatnoj natpisnoj pločici definirane su karakteristike motora pri radu na različitim frekvencijama.

Grafikon 1. Rad preko frekventnog pretvarača (dozvoljena opterećenja vrijede za trajni rad – pogon S1)



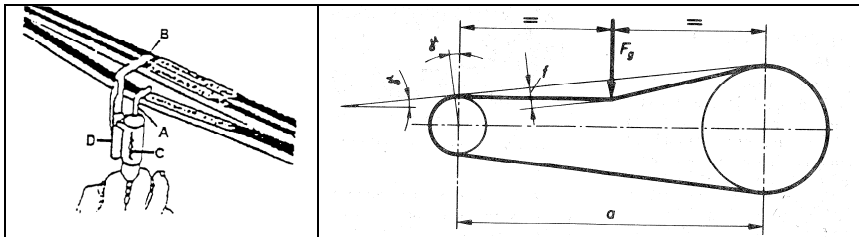
Natpisne pločice su u pravilu zakovane na glavnom kućištu motora, a tamo gdje to nije moguće, smještena je ili na ventilatorsku kapu ili plastičnu kutiju kod jednofaznih motora, odnosno na mjesto gdje je osigurana čitljivost prikazanih podataka.

Prilikom naručivanja rezervnih dijelova motora najbitniji podatak je podatak naveden za Code motora i naravno podatak o dijelu kojeg korisnik treba zamijeniti tijekom servisa ili redovitog održavanja.

Uz ove upute isporučuje se rastavni crtež motora s uputom za naručivanje.

Provjera remenskog prijenosa

U slučaju pogona preko remenskog prijenosa pobrinite se da redovito provjeravate remenski prijenos tijekom inicijalnih radnih sati. Pogonski remen treba pregledati i ponovno zategnuti – ako je potrebno – nakon radnog perioda od između 0,5 i 4 sata pod punim opterećenjem, a potom u intervalima od otprilike 24 radnih sati



Provjera ostvarene sile zatezanja remena vrši se na osnovu njegovog progiba izazvanog silom F_g . Kako bi izmjerili progib pozicionirajte mjernu skalu s opteretivom kukom A u centar remenske staze. Postavite vučni pokazivač na nulu. Primijenite ispitnu silu u skladu sa skalom C. Za ovo, povucite mjernu skalu pod kutom od 90 stupnjeva od remenske staze. Pročitajte dubinu utiska na skali D vučnog pokazivača. Odnos sile zatezanja F_p , pritiskivanja F_g i progiba može se izraziti prema sljedećoj približnoj formuli: $F_p = 0,25(a/f)F_g \cos \gamma - (10...20)N$.

Iznos sile F_g za remene određuje se prema veličini presjeka, s tim da progib ne bude manji od $f > 0,01a$ (a – osni razmak), a za remene iz tablice 1. Vrijednosti sile F_g

Presjek remena	SPZ	SPA	SPB	SPC	Y	Z	A	B	C	D	E
F_g [N]	25...27	45...50	75	125...140	13	24	40	70	120	240	360

Ako je potrebno, pravilno postavite napetost remena sve dok se ne postigne specificirana dubina impresije f . Ako se pogonski remen pravilno ne zategne, za rezultat ćete dobiti nedovoljni prijenos snage i prijevremeno zatajenje pogonskog remena. Prevelika zategnutost će biti dodatni uzrok oštećenja na ležajevima. Prilikom zatezanja remena, osigurajte da bočno poravnanje remena ne odstupa više od 1 stupnja.

8. POSEBNOSTI U UPOTREBI I ODRŽAVANJU, VEZANE UZ POJEDINE IZVEDBE / SERIJE / TIPSKE OZNAKE

MOTORI SERIJA/TIPSKIH OZNAKA 5.xAZC/AZCD (JEDNOFAZNI MOTORI)

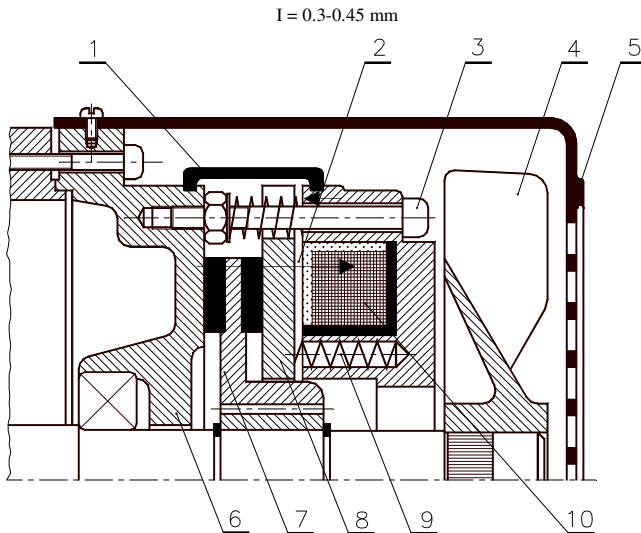
- ❖ kod montaže i rukovanja paziti da ne dolazi do udaraca po priključnom ormariću koji je od termoplasta, a u kojeg su smješteni pogonski i zaletni kondenzatori, sklopke i sl.
- ❖ najčešće se za jednofazni motor u svrhu zaštite namota od pregrijavanja koriste bimetalni prekidači – termoprotektori (automatsko ponovno uklapanje), i klixioni (ručno ponovno uklapanje)
- ❖ motore s termičkom zaštitom s automatskim ponovnim uklapanjem primijeniti **samo tamo gdje to dozvoljavaju sigurnosni propisi** radi izbjegavanja ozljeda (dakle **nikako** kod kružnih pila, stolarskih i brusnih strojeva, mlinova, kosilica i sl.)
- ❖ jednofazne motore s kondenzatorima nije preporučljivo startati više od 20 puta u satu radi mogućeg uništenja kondenzatora
- ❖ standardno se ovi motori priključuju na mrežu 230V $\pm 5\%$ 50Hz pri čemu postižu nazivne podatke deklarirane na natpisnoj pločici motora

MOTORI SERIJA/TIPSKIH OZNAKA 5.xAZK/AZPK i 7AZK/AZPK
(S PRIGRAĐENOM SIGURNOSNOM ELEKTROMAGNETSKOM KOČNICOM)

- ❖ kod priključivanja poštivati uputu za priključak koja se nalazi u priključnom ormariću motora
- ❖ ovisno o zahtjevu pogona na brzinu uklapanje kočnice (isključivanje napona), kočnica se može spojiti tako da se isklapanje kočnice obavlja u izmjeničnom krugu (normalno aktiviranje) ili isklapanjem u istosmjernom krugu čime se aktiviranje kočnice skraćuje za 30 - 40 puta
- ❖ ovisno o raspoloživom izvoru napajanja u motore se ugrađuju :
 - punovalni ispravljač kada je motor predviđen za spoj trokut (380/400 D) a postoji nul vodič (ispravljač je spojen između faze i nule) ili za spoj zvijezda (380/400 Y) (ispravljač je spojen između jedne faze i zvjezdišta motora), $U_i = 220/230V$
 - poluvalni ispravljač kada je motor predviđen za spoj trokut (380/400 D) a ne postoji nul vodič u napajanju (ispravljač je spojen između dviju faza), $U_i = 380/400V$. Svitak kočnice je u oba slučaja za napon 190V istosmjerno
- ❖ kočnica s naponom napajanja svitka 24 odnosno 48V istosmjerno, priključuje se u odgovarajući rasklopni ormar stranke preko transformatora i ispravljača za napajanje, a s radom motora povezana je sklopnikom
- ❖ zračni raspор kočnice tvornički je namješten preko vijaka (poz. 3) na nazivnu vrijednost ($l = 0.3 - 0.45 \text{ mm}$)

Preporučujemo nabaviti kao rezervni dio odgovarajući ispravljač kočnice (poz. 34) prema popisu standardnih rezervnih dijelova.

Skica sigurnosne elektromagnetske kočnice



1 Zaštitna guma	6 Ležajni štít - stražnji
2 Zračni raspор	7 Kočioni disk
3 Vijak za montažu kočnice	8 Potisna ploča
4 Ventilator	9 Potisna opruga
5 Ventilatorska kapa	10 Elektromagnet kočnice

MOTORI SERIJA/TIPSKIH OZNAKA 5 i 7AT(ATP, ATPV, ABT, ABTP, ABTPV) U PEX- ZAŠTITI OKLAPANJE - " d "

MOTORI SERIJA/TIPSKIH OZNAKA 5.xAZS U PEX- ZAŠTITI POVEĆANA SIGURNOST - " e "

MOTORI SERIJA/TIPSKIH OZNAKA 5.x i 7AZN (ABZN) U PEX- ZAŠTITI NEPALEĆI UREĐAJI ZA ZONU 2 - " n "

Za motore ovih serija uz ove upute se izdaje i "Izjava proizvođača" kao dokaz o provedenoj kontroli i ispitivanjima, te izvedenosti u skladu s certificiranom dokumentacijom

- ❖ motori se moraju instalirati i upotrebljavati sukladno s odgovarajućim propisima protueksplozijske zaštite obzirom na klasifikaciju zona opasnosti, područja primjene, temperaturne klase i eksplozivne grupe zapaljivih tvari, odnosno sukladno s podacima datim na motorskoj natpisnoj pločici i pločici protueksplozijske zaštite. Motori u PEX-zaštiti "d" i "n" mogu biti napajani preko statičkog pretvarača frekvencije u uvjetima prema IEC 60034-17. Tada motori moraju imati ugrađenu termičku zaštitu u namotu statora. Ovi motori imaju i višenaponsku pločicu sa na kojoj je definirano područje regulacije i potrebnu redukciju momenta/snage ovisno o uvjetima rada. U slučaju nejasnoća konzultirati proizvođača.
- ❖ motori u PEX-zaštiti oklapanje "d" namjenjeni za rudarstvo nisu za prostore s teškim uvjetima rada.
- ❖ zaštita od preopterećenja u upravljačkom ormaru (na instalacijama), treba biti podešena u skladu s normom HRN IEC 60079-14, a za motore u PEX-zaštiti povećana sigurnost "e" dodatno, u skladu s kritičnim vremenom zagrijavanja do dostizanja dopuštene nadtemperature motora za određeni temperaturni razred označenim u tipnoj oznaci motora i odnosom IA/IN označenim na natpisnoj pločici motora
- ❖ svi motori moraju biti opremljeni odgovarajućim kabelskim uvodnicama u skladu s zahtjevima odgovarajućih normi. Kod uvodnica s cilindričnim navojem zaštita od odvrtanja izvodi se maticom s unutarnje strane kućišta, (kontra-matica) ili odgovarajućim punilom, npr.(LOCTITE 243). Motori se iz tvornice isporučuju bez punila, a odgovornost za osiguranje uvodnice od odvrtanja je na ovlaštenom izvoditelju kod instaliranja motora u pogonu
- ❖ Uvod kabela ostvaruje se standardno sa uvodnicama M xxx1,5 prema tablici, a u slučaju odstupanja od standarda ista je naznačena na natpisnoj pločici ili deklaraciji proizvođača.

IEC veličina motora / IEC motor size	Series 5AT / 7AT / 5AZS / 5AZN / 7AZN		IEC veličina motora / IEC motor size	Series 5AT / 7AT / 5AZS / 5AZN / 7AZN	
	Broj uvodnica x Veličina uvodnice / Number of glands x gland size	Promjer priključnog kabela M(mm) / Diameter of connection cable M(mm)		Broj uvodnica x Veličina uvodnice / Number of glands x gland size	Promjer priključnog kabela M(mm) / Diameter of connection cable M(mm)
63	1 x M16x1.5	5 - 10	160	1 x M32x1.5 + čep/plug	18 - 25
71	1 x M20x1.5	6 - 12	180	1 x M40x1.5 + čep/plug	22 - 32
80	1 x M20x1.5	6 - 12	200	2 x M40x1.5	22 - 32
90	1 x M20x1.5	6 - 12	225	2 x M50x1.5	29 - 38
100	1 x M25x1.5	13 - 18	250	2 x M50x1.5	29 - 38
112	1 x M25x1.5	13 - 18	280	2 x M50x1.5	29 - 38
132	1 x M32x1.5 + čep/plug	18 - 25	315	2 x M63x1.5	34 - 44

- ❖ Na motorima isporučeni sa adekvatno propisima izvedenim navojnim rupama za prihvat kabelaških uvodnica i zatvorenim plastičnim čepovima radi zaštite navoja, ovlašteni izvoditelj instalacija dužan je u te rupe ugraditi certificirane kabelaške uvodnice, a ako ima višak rupa treba ih zatvoriti adekvatnim certificiranim čepovima, sukladno propisima. Također kod izvođenja spajanja motori moraju biti priključeni sa izoliranim stopicama.
- ❖ U slučaju rastavljanja i sastavljanja motora mora se osigurati postojeća mehanička zaštita (upotreba sredstava za brtvljenje kod dosjednih spojeva, premazivanje vijčanih spojeva sa punilima, ispunje masti kod ležaja, podmazivanje osovinških brtvila...)

Posebnosti vezane uz znak X certifikata EX – Agencije

S obzirom na posebnosti vezane uz ograničenja prilikom upotrebe, instaliranja i održavanja PEX motora iz proizvodnog programa i nemogućnosti navođenja svih na ovom mjestu, molimo korisnika odnosno ovlaštene osobe za instaliranje opreme da prouče Izjavu proizvođača u kojoj su navedena sva navedena ograničenja za predmetni proizvod (motor). Servis ovih motora obavezno obavlja proizvođač KONČAR - MES d.d. ili popravljači s liste odobrenih popravljača. U Republici Hrvatskoj to su popravljači koji su upisani u Registar popravljača pod tehničkim nadzorom Ex-Agencije . U inozemstvu to su serviseri u skladu s lokalnim propisima.

Bez posebnog pismenog odobrenja proizvođača svaki je zahvat koji ima ili može imati utjecaja na protueksplozijsku zaštitu motora (bilo u garantnom roku ili izvan) isključivo na vlastitu odgovornost izvoditelja zahvata, a što se posebno odnosi:

-kad se izvode radovi na zaštitnim sastavima na motorima PEX-zaštite "d". Kod takvih radova potrebno je zatražiti upute (i dimenzije) od Končar-MES d.d. jer su zračni raspori manji od onih dopuštenih u normi HRN EN 60079-0,-1.

-Temperatura kabela kod motora s priključnom kutijom predviđenih za temperature okoline >50 °C na mjestu uvoda je veća od 70 °C odnosno na mjestu rasplitanja veća od 80 °C, stoga se priključak elektromotora mora izvesti s kablom temperaturne postojanosti > 85 °C za Tok= 50 °C, temperaturne postojanosti >95 °C za 50 °C < Tok < 60 °C i temperaturne postojanosti >115 °C za < 60 °C Tok < 80 °C.

-Kod motora 7A.T.132, 7A.T.160, 7A.T.180, 7A.T.280, 7A.T.315 vijci koji drže integritet kućišta izvedenog u vrsti zaštite oklapanje "d" obvezna primjena imbus vijaka (ISO 4762) granice tečenja 800 N/mm².

-Kod motora 7A.T.200, 7A.T.225, 7A.T.250 vijci koji drže integritet kućišta izvedenog u vrsti zaštite oklapanje "d" obvezna primjena imbus vijaka (ISO 4762) i to na ležajnim štitovima granice tečenja 1200 N/mm² a granice tečenja 800 N/mm² u priključnoj kutiji.







-Završni kraj kabela u izvedbi elektromotora s izravnim uvodom mora biti spojen u priključnoj kutiji izvedenoj u jednoj od vrsta protueksplozijske zaštite sukladno HRN EN 60079-0 ili izvan ugroženog prostora. Za motore s izravnim uvodom spoj slobodnog kraja kabela motora mora se izvesti u priključnoj kutiji u jednoj od vrsta protueksplozijske zaštite sukladno EN 60079-14 ili izvan ugroženog prostora. Kabel od uvoda u motor do mjesta spajanja izvan ugroženog prostora mora biti odgovarajuće mehanički zaštićen, minimum IP 20.

-Za rad preko pretvarača frekvencije: Motor je sukladan s IEC 60034-17, te može raditi preko frekvencijskog pretvarača (2p=2; 5 do 87 Hz i 2p= 4, 6, 8; 5 do 100 Hz). U namot elektromotora ugrađene su 3xPTC-130°C ± 5 °C (T4) ili 150°C ± 5 °C (T3) apsolutno temperature prorade (ovisno o temperaturnom razredu), sukladno zahtjevima norme IEC 60034-11. Karakteristike termosondi su sukladne zahtjevima normi DIN 44081/44082. Dijagramom M/Mn i podacima na natpisnoj pločici dan je raspon regulacije brzine i s njom u vezi redukcija momenta odnosno snage elektromotora. Zbog zaštite elektromotora od prenapona i brzine porasta napona odabrani pretvarač mora biti sukladan zahtjevima navedenim u normi IEC 60034-17. Zaštita elektromotora od kratkog spoja i zemljospoja mora biti provedena zaštitnim uređajem u samom frekvencijskom pretvaraču.

Označavanje motora u PEX zaštiti

Svaki motor u PEX zaštiti pored osnovne natpisne pločice prema točki 7. ovih uputa ima na kućištu dodatnu pločicu s podacima o vrsti protueksplozijske zaštite.

Motore u PEX zaštiti “oklapanje – Exd” , “povećana sigurnost – Exe” i zaštiti 2neiskreći el. Uređaji – ExnA“

Natpisna pločica za motore Exd(e), Exe i ExnA motore s certifikatom Ex - Agencije	 KONČAR ZAGREB Croatia KONČAR - MES d. d. Code N° /Decl. Type Protect.  
Natpisna pločica za motore EExd(e), Exe i ExnA motore s certifikatom CESI	 KONČAR ZAGREB Croatia KONČAR - MES d. d. Code N° /Decl. Type Protect.  

Na natpisnoj pločici nalaze se slijedeći podaci:

Code: Broj motora koji služi identifikaciji tijekom proizvodnog procesa, a u održavanju kao osnova za naručivanje rezervnih dijelova za dotični motor
N°: Tvornički broj motora
Type rating: Broj izjave proizvođača o sukladnosti s certifikatom
Type: Tipaska oznaka motora
Protection: Vrsta protueksplozijske zaštite

Dodatno za motore u PEX zaštiti “povećana sigurnost – e”

IA/IN: odnos struje kratkog spoja i nazivne struje motora

t_E: vrijeme u kojem uređaj mora isključiti predmetni motor s naponske mreže, a za to vrijeme niti jedan dio površine električnog uređaja neće dostići temperaturu navedenog temperaturnog razreda

9. MOGUĆE VRSTE KVAROVA I SMETNJI U RADU KOD ASINKRONIH KAVEZNIH MOTORA I NJIHOVO OTKLANJANJE

KVAR / SMETNJA	MOGUĆI UZROK	OTKLANJANJE
Motor ne zalijeće, nema šuma ili jako bruji	<ul style="list-style-type: none"> -Prekid u napajanju, jedan dovod prekinut, npr. osigurač -Prekid u krugu statorskog namota, preklopici Y/D, ispad zaštite -Oštećeni ležajevi -Nepropisno spajanje -Pomoćna ili glavna faza u prekidu -Oštećen kondenzator (motor kreće kada se pokrene rukom) -Oštećena centrifugalna sklopka -Oštećen ili neuključen klixon 	<ul style="list-style-type: none"> -Provjeriti osigurače, motorski sklopnik, kontaktor, osigurače ... -Odvojiti napojne vodove, kontrolirati namot na izvodima priključne pločice, provjeriti elemente el. zaštite -Zamijeniti ležajeve -Spojiti motor prema odg. uputama -Popravak ili zamjena namota -Zamjeniti kondenzator -Zamjeniti ili popraviti CF sklopku -Zamjeniti – uključiti klixon
Motor se ne zalijeće pod opterećenjem ili zalijeće teško, brzina vrtnje pod opterećenjem iznenada opadne	<ul style="list-style-type: none"> -Prevelik protumoment tereta (preopterećenje) -Motor namjenjen za spoj D, a spojen je u Y -Nizak napon mreže -Kvar u dovodu -Rotorski štapovi ili kratkospojni prsten u prekidu 	<ul style="list-style-type: none"> -Uskladiti sa zahtjevom na veličinu motora -Primjeniti pravilan način spajanja motora -Stabilizirati napon mreže -Provjeriti ispravnost napajanja -Zamjeniti rotor
Kod starta izbacuje osigurač ili zaštitni sklopnik	<ul style="list-style-type: none"> -Vodovi od zaštitnog sklopnika do motora u kratkom spoju -Dvije faze statorskog namota su u kratkom spoju ili imaju spoj s masom -Pogrešno odabrana el. zaštita 	<ul style="list-style-type: none"> -Razdvojiti i izolirati vodove -Motor odspojiti s napajanja - potrebno prematanje motora -Pravilno dimenzionirati zaštitu
Motor se u pogonu previše grije, šumovi struganja, motorska zaštita izbacuje nakon nekog vremena	<ul style="list-style-type: none"> -Preopterećenje motora (kod 1f motora izbacuje klixon) -Previsok ili prenizak napon napajanja -Prevelika učestalost uklapanja -Motor radi jednofazno -Rotor struže o stator 	<ul style="list-style-type: none"> -Izmjeriti struju motora. Ukoliko je daleko veća od nazivne ukloniti uzrok preopterećenja -Stabilizirati napon napajanja -Smanjiti broj uklapanja -Provjeriti dovode -Popravak rotora ili motora
Motor se jako grije već u praznom hodu, vuče veliku struju, bruji (1f motori - izbacuje termička zaštita)	<ul style="list-style-type: none"> -Pogrešan spoj statorskog namota -Previsok napon mreže -Nedovoljno hlađenje -Spoj među zavojima ili na masu 	<ul style="list-style-type: none"> -Pravilno spojiti motor prema podacima s natpisne pločice i odgovarajućim uputama -Stabilizirati napon mreže -Osigurati neometan protok zraka do i oko motora -Zamjena namota
Motor u radu uzrokuje pojačanu i nenormalnu buku	<ul style="list-style-type: none"> -Električni razlozi -Oštećenje ležajeva -Oštećenje prigona na koji je motor priključen -Neizbalansiranost rotora -Nedovoljna pričvršćenost na podlogu ili priрубnicu -Struže disk kočnice 	<ul style="list-style-type: none"> -Konzultirati proizvođača -Zamijeniti ležajeve -Provjeriti prigon -Dinamički dobalansirati rotor ili pogon -Pritegnuti odgovarajuće vijke odgovarajućim momentom -Provjeriti zračni raspod odnosno istrošenost obloga

10. ŽIVOTNI VIJEK MOTORA PROIZVODNJE KONČAR - MES d.d.

- pod normalnim uvjetima uporabe predviđenim uputama za rukovanje i održavanje, te uz normalno redovno održavanje životni vijek motora se bitno produljuje,
- proizvođač osigurava raspoloživost rezervnih dijelova unutar perioda do 7 godina uključujući i jamstveni period. Servis kod proizvođača moguć je i za proizvode starije od 7 godina uz posebne uvjete ugovaranja
- sva dokumentacija proizvoda na raspolaganju je 10 godina nakon prestanka proizvodnje
- za pakiranje koristimo ekološke materijale koji se bez opasnosti po okoliš ponovo prerađuju (recikliraju), deponiraju ili uništavaju. U tu svrhu i ambalažni materijali su odgovarajuće označeni.
- Kada prestanete koristiti elektromotor pazite da ne bude teret okolišu. Predajte ga ovlaštenim sakupljačima.

11. ZAHTJEVI U JAMSTVENOM ROKU

Nedostaci u radu ili nastala oštećenja na proizvodima **unutar jamstvenog roka** trebaju, ako su uzrokovani greškom u materijalu ili kakvoći izrade, biti prijavljeni proizvođaču " **KONČAR - MES d.d.** " uz navođenje slijedećih podataka :

- točni podaci natpisne pločice motora (tipska oznaka i kodni broj)
- kako je motor bio spojen u rad
- karakteristike pogona
- kako se nedostatak pokazao (način pojave nedostatka)

Nedostaci u radu ili oštećenja nastala zbog neadekvatne i nepažljive uporabe prilikom transporta / skladištenja / priključivanja, **ne smatraju se opravdanim** kao reklamacijski zahtjevi unutar jamstvenog roka.

Isto vrijedi i ako je proizvod prije dostave proizvođaču bio rastavljan unutar jamstvenog roka.

12. IZJAVA O JAMSTVU

Sustav kakvoće uspostavljen u **KONČAR - MES d.d.** certificiran je u skladu sa zahtjevima norme **ISO 9001**. Na osnovu toga pravilan rad naših proizvoda osiguran je rigoroznom kontrolom u procesu i završnom kontrolom prije otpreme kupcu na osnovu koje se izdaje jamstveni list. Ukoliko bi i pored toga došlo do neispravnosti i poremećaja u radu uvjetovanih nesolidnošću izrade ili lošim materijalom obvezujemo se da ćemo u jamstvenom roku iste otkloniti na naš trošak i uspostaviti zajamčenu ispravnost proizvoda.

Jamstvo vrijedi **12 mjeseci** ili kako je to definirano ugovorom i teče od dana prodaje/preuzimanja proizvoda što se dokazuje pečatom prodavatelja na jamstvenom listu uz datum i potpis i priloženim računom.

Kupac je dužan pridržavati se datih uputa za uporabu i održavanje priloženih uz svaki motor koji nosi natpisnu pločicu proizvođača **KONČAR - MES d.d.**

Nadoknađujemo troškove prijevoza, odnosno prijenosa u vezi s popravkom u jamstvenom roku na temelju propisno ispostavljenog računa po važećoj željezničkoj odnosno poštanskoj tarifi do uputne željezničke stanice odnosno pošte.

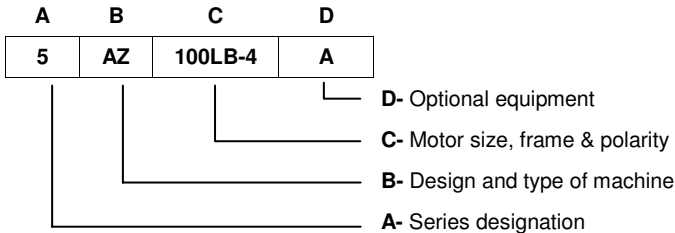
Ako u jamstvenom roku popravak traje dulje od 10 dana, računajući od dana prijave, jamstveni rok se produljuje za onoliko dana koliko je trajao popravak. Ukoliko se isti ne izvrši u roku od 45 dana računajući od dana prijave, odnosno nemogućnosti otklanjanja nedostatka, proizvod zamjenjujemo novim. Pogreške koje **se ne odnose** na loš materijal i nesolidnu izradu **ne smatraju se** proizvođačkim, te se za njihovo otklanjanje i tako nastale troškove tereti kupac proizvoda po važećem cjeniku proizvođača **KONČAR - MES d.d.**

Popravke unutar i izvan jamstvenog roka obavlja **KONČAR - MES d.d.** HR - 10000 Zagreb, Fallerovo šetalište 22.

1. GENERAL

These basic instructions are referring to catalogue EN/IEC low voltage squirrel-cage induction motors of totally enclosed design (index of protection IP55 or higher acc. to IEC 60034-5), of ribbed frame outer surface cooled with own fan situated under the fan cover (cooling method IC411 acc. to IEC 60034-6), in frame sizes 56-315 or of drip-proof design (index of protection IP23 acc. to IEC 60034-5) of smooth surface frame cooled internally with own fan situated under the NDE bearing shield (cooling method IC01 acc. to IEC 60034-6) in frame sizes 180-250. Series, design and type can be determined from the type designation of the motor.

Type designation consists of a group of letters and numbers determined by internal manufacturer's standard.



Series designation (mark A):

- 5 motor series design in aluminum alloy housing (design B3 – cast feet)
- 6 motor series design in aluminum alloy housing (design B3 - mounted feet)
- 7 and 8 motor series design in cast iron housing (design B3 - mounted feet)

Motor type designation (mark B):

- AZ totally enclosed induction motor
- AZA motors with different mechanical construction
- ABZ shipboard use motors
- AZC single-phase capacitor run motors
- AZCD single-phase capacitor run/start motors
- AZCG single phase induction generators
- AZCJ single-phase capacitor start motors
- AZCS motors in Steinmetz connection
- AZD motors for elevator drives
- AZE motors with different electrical design than standard
- AZG induction generators
- AZH motors with increased power output
- AZK motors with electromagnetic brake
- AZN explosion-proof motors: ex. protection: “non-sparking electrical apparatus for zone 2 without el. circuit breakage-Ex nA II”
- AZP multi-speed motors with constant torque at all speeds
- AZPV multi-speed motors for fans
- AZS explosion-proof motors: ex. protection “increased safety – Ex e II”
- AT explosion-proof motors: ex. protection: “flame proof - Ex d(e) I/II”
- AZV motors for fan drives with special winding
- AO drip-proof (IP23) motors
- AOG drip-proof (IP23) induction generators
- ABO shipboard use drip-proof (IP 23) motors

Mark C describes as follows:

56 – 315	frame size
S, M, L	housing length
A, B, C	active part length in same length of housing
2,4, 6/4..	motor polarity

Optional mark or machine construction (mark D):

A	motors with winding heater
G	motors with feedback device
K	motors with connection cable
S	motors with build-in switch
T	motors with thermal protection
V	force ventilated motors (separate fan)
Z	motors with stator winding filled with compound

All motors from this catalogue are made in their basic design in the index of protection **IP55**. This is the art of protection which protects persons against the contact with the parts under electrical tension ("live" parts), and the moving parts inside of enclosure. Further, it protects the electric device itself from the harmful down settling of dust and from the water jets from all directions. Index of protection is defined on the motor's nameplate and should be considered when installing the motor into the working position.

On request, there are also motors made to comply with other indexes of protection, usually **IP56**, **IP65** and **IP66**.

2. TRANSPORTATION AND STORAGE

The motors must be transported by means and in such a way which prevents the possible damage, i.e. they must be positioned exactly like they are situated in their basic and original transport packing. The storage in dry indoor areas far away from possible corrosion hazards is recommended. In case of longer storage time, it is necessary at least once per year to turn the rotor manually for one full circle. If more than 3 years have passed from the delivery time during which the motor was not put into motion, it is necessary to change the bearings, or if those are regreasing kind, follow the procedure described in the paragraph 6.

Motor storage handling must be performed in a regular way using the lifting rings on motors or the pallet system.

3. SETTING INTO WORKING POSITION

Foot-mounted motors must be put on a hard ground adequately to their size and mounting requests stated in IEC 60034-7 and fixed with screws. Flange-mounted motors are fixed directly with screws on the counter flange of driven machine.

Before setting the motor into working position the protective cylindrical cover is to be removed from shaft. The motors must be situated in such way which assures the sufficient ventilation and heat transfer area. Minimum distance in mm, from fan cover or from suction/exhaust lousie openings, to an obstacle must be at least equal to the rated motor frame size/shaft height figure.

The motors are intended for outdoor and indoor mounting for duty in ambient of moderate humidity, low corrosive aggressiveness, temperature range from -20 to +40 °C and up to 1000 m height above the sea level, or for mounting indoors, dust-free areas (group AO, ABO).

In case of reduced cooling condition at higher altitudes or higher environmental temperatures, motor power should be changed according to tables below:

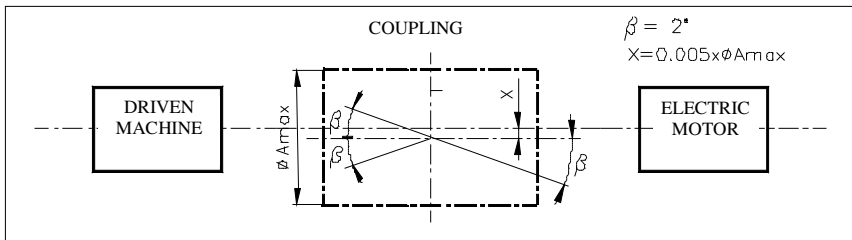
Cooling air temperature °C	30	35	40	45	50	55	60
% rated power	100	100	100	96	91	86	80

Altitude above the sea level [m]	2000	3000	4000
% rated power at ambient temperature of 40°C	92 %	84%	78%
Rated power at ambient temp. in °C	32°C	24°C	16°C

Motors produced with protected windings for tropical working conditions bear the marking "TROPICALIZED".

Before every installation the motor must be checked for possible damages or possible irregular mounting circumstances which can influence the proper operation. During assembly on transmission unit or driven machine, punching and applying of excessive force must be avoided, especially in direction of motor drive axis because this can cause bearing damage or permanent disturbance of safety gaps in motors protected with "explosion-proof enclosure – d". If needed, the data about permitted radial and axial forces acting on motor DE and depending upon the mounting arrangement can be requested from manufacturer. All fixing screws must be tightened with adequate torque in order to assure smooth work of motor itself, without vibrations, deformations or overstress. The screws must be secured from unfastening.

If non-elastic couplings are used, the proper coaxial alignment with DE shaft must be assured during assembly (acc. to the sketch) and at belt transmissions the magnitude of belt tension force and it's perpendicularity to the DE shaft must be considered.



Rotors are dynamically balanced with half-key acc. to ISO 8821, so that all elements which are directly mounted on DE motor shaft must be also dynamically balanced on the same way.

4. CONNECTING TO THE POWER SUPPLY NETWORK AND SAFETY/PROTECTION MEASURES

Before connecting the motor to the power supply the special care must be taken about the following:

- ❖ that the motor data on nameplate corresponds to the power supply voltage and frequency
- ❖ that the terminals are connected according to appropriate connection diagram labeled inside of motor terminal box, or according to the nameplate data and the

power supply itself (in case if motor starting via the Y/D switch is requested, the bridges from terminal plate must be removed!)

- ❖ that the protection of live parts is maintained according to local safety regulations. The earthing lead must be connected to specially marked place inside of terminal box and the motor must be earthed also via the bolt situated outside on the frame. Earthing lead cross-section area must be greater than or equal to those one of phase lead. Outer earthing clappings are foreseen for earthing lead of minimum cross section area of 4mm² (frame sizes up to 180) or of 16mm² (frame sizes 200 to 315)
- ❖ all valid safety measures must be regarded acc. to actual protection system against the electric current shock
- ❖ that terminal box interior is free from dirt, connecting material particles or the like
- ❖ that all terminals on motor terminal plate are hard tightened. Max. Moments for tighten are:: M4 – 2Nm, M5 – 3,2Nm, M6 – 5Nm, M8 – 10Nm i M10 – 20Nm
- ❖ that energy supply cable (and eventually cable(s) for auxiliary devices supply) is adequately sealed by the means of the motor terminal box cable glands
- ❖ that adequate protection against short-circuit and overload (fuses, bimetal relays, thermal protection or the like) is assured
- ❖ that motor connecting to the power supply is performed with the cable of adequate dimensions and heat resistance (for AT series motors there are special requests stated for cables defined in "Manufacturer's declaration")

On three-phase power supply with voltages 400V can be connected the motors with nameplate data D/Y 400/690V in winding connection delta (D) acc. to connection diagram labeled inside of terminal box.

On same power supply network, motors with nameplate data D/Y 230/400V in connection star (Y) can also be connected. Motors with those data can be connected also on three-phase network voltage 230V but they must be in winding connection delta (D). Generally, the motors are connected to the power supply network via the three-pole switch, three-pole motor protection circuit breaker or contactor.

In case of starting via the star-delta (Y/D) switch, the winding connection of motor for rated voltage must be delta (D). In this case the starting current amounts 1/3 of such current in direct connection as does the starting torque, and this must be considered, i.e. in such way only motors with no load can be started. Two-speed motors with series-parallel winding (tap wound –speed ratio 1:2) are started by means of special switch. Net connecting of two and multi-speed motors is performed in accordance to the connection diagram labeled inside of motor terminal box with adequate protection against the short circuit and overload.

Generally, the three-phase motors manufactured by **KONČAR-MES d.d.** are designed acc. to requests of standard IEC 60038 and can work without problems under rated power and torque load with network voltage aberration of ±10%, until the single-phase **KONČAR-MES d.d** motors can work under such conditions with network voltage/frequency aberration of ±5% / ±1%. If the voltage aberration is greater, the motor cannot be loaded with rated torque but with the torque which must be corrected in proportion to voltage drop.

Drives where the motor is supplied via the static frequency converter (speed regulator), the recommendations from the standard IEC 60034-17 are applied, so considering these, the care must be taken when choosing the rotational speed regulator. For motor supply it is desirable to use the frequency converter (rotational speed regulator) equipped with output dU/dt filter in order to achieve higher motor winding longevity. For such supply it is useful to contact the motor manufacturer regarding the motor characteristics and regulation range.

If motor has built-in anti-condensation heaters, they are to be connected acc. to the attached connection instruction and energized during the motor is in standstill state.

5. ROTATION DIRECTION CHANGE AND NUMBER OF STARTS PER HOUR

The motors of standard design have the clockwise direction of rotation viewed from the shaft DE, and they are connected acc. attached instructions. Change of rotation direction is usually performed by changing the terminal sequence of two supply net phases. At often changing of rotation direction, the special switch for reversing is to be used, taking care about the permissible reversions per hour for particular drive and load (if necessary, consult the manufacturer). The same is valid for permitted number of starts in order to not overload the motor.

Rotation direction change at single-phase motors is performed with connector exchange of main or of auxiliary phase. Before reversing the motor must be at standstill (on contrary, it will keep the same rotation direction).

6. MAINTENANCE

The motors are designed for the easy and simple maintenance. Properly installed and electrically / thermally protected they can work for years.

Periodically they need to be exterior cleaned and if they work in environment where impurities can close the ventilation openings on fan cover or fill the spaces between the cooling ribs, such impurities must be blown out with compressed air or swept-off with brush. Any aberration from motor ratings or irregular motor operation must be carefully inspected for possible cause (i.e. increased motor current, temperature increase over the permitted value for the declared insulation class, increased vibrations, peculiar noises, specific insulation smell presence, activated motor protection devices or the like). If this is caused by the motor, the repair work must be performed by the authorized and skilled personnel only.

For spare parts contact the manufacturer with exactly determined motor type mark and code number from motor nameplate (please note the ordering instruction attached).

Standard bearing assembly is with single row deep-groove ball bearings (ZZ or 2RS), with clearance C3 (motors of 7AT132-280 series are made with standard clearance bearings) as listed in table below. The bearings are lubricated for life. Bearing change in case of breakdown, noise or at regular service intervals must be performed with adequate tools without applying of excessive force and punching.

If bearings with regreasing possibility are built-in, the intervals between regreasing are as shown in the diagram attached. During service repair such bearings are to be taken off from shaft in the proper way, washed well in gasoline, dried, put on the shaft in the proper way, regreased with adequate grease in such way that approx. 2/3 of bearing nest free space is filled with grease. Alternatively, the regreasing can be performed also during the motor is in operation, via regreasing nipples situated on bearing shields using the hand pump for consistent grease. Depending upon the motor size (mostly 132-280), at each regreasing approx. 20-40 grams of grease must be pressed-in. Recommended grease brands are LIS-2 (INA), SHELL ALVANIA G3, ESSO UNIREX N3, or all others lithium soap based with drip temperature of 180-200 °C and for use in environment temperature range from -20 °C to +150 °C.

	Frame size	Bearing type on both sides for series 5. i 7.	Bearing type on both sides for series 8.
T.E. design	56	6201 – 2Z ili 2RS	
	63	6202 – 2Z ili 2RS	
	71	6203 – 2Z ili 2RS	
	80	6204 – 2Z ili 2RS	
	90	6205 – 2Z ili 2RS	
	100	6206 – 2Z ili 2RS	
	112	6306 – 2Z ili 2RS	
	132	6208 – 2Z ili 2RS	

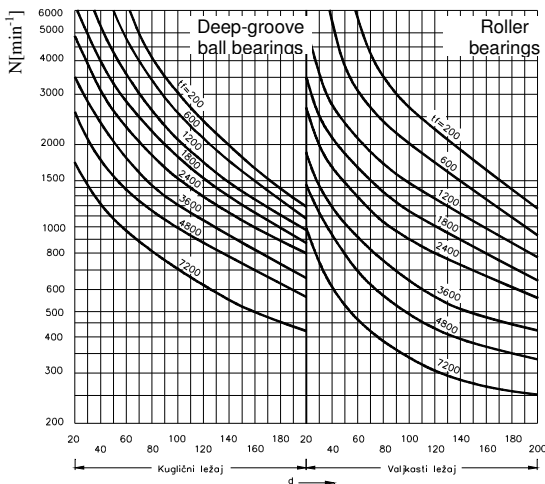
	160	6309 – 2Z ili 2RS	
	180	6310 – 2Z ili 2RS	6311
	200	6312 – 2Z ili 2RS	2 pol: 6312 4 pol: NU 312 / 6312
	225	6313 – 2Z ili 2RS	2 pol: 6313 4 pol: NU 313 / 6313
	250	6314 – 2Z ili 2RS	2 pol: 6315 4 pol: NU 315 / 6315
	280	6316 C3	2 pol: 6317 / 6314 4 pol: NU 317 / 6314
	315	6316 C3	pol: 6317 / 6317 4 pol: NU 319 / 6319
Drip-proof design	180	6212 – 2Z ili 2RS	
	200	6213 – 2Z ili 2RS	
	225	6214 – 2Z ili 2RS	
	250	6216 – 2Z ili 2RS	

On request, in motors of frame sizes 132-250 also the single-row roller bearings can be built-in series NU.

Remarks :table is valid for all polarities of single and multi-speed motors and for all mounting arrangements acc. to IEC 60034-7 (EN60034-7)

- nominal bearing life under rated working conditions is minimal 40000 working hours for 4, 6 and 8-poles motors, and minimal 20000 working hours for 2-poles motors connected to 50Hz power supply network.

Bearing regreasing interval determining diagram:



Example :

Deep-groove ball bearing with inner dia. of 40mm and rotational speed of 1500 rpm needs to be regreased approximately after every 6000 working hours (interpolation).

d - inner bearing diameter (mm)

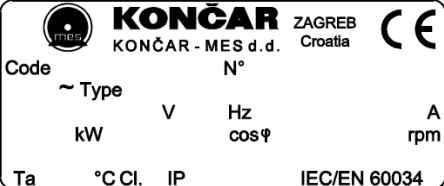



n - rpm (min^{-1})

t_r - regreasing interval (working hours)

During each disassembly of motor, we recommend installation of new shaft seals and seals securing the protection index of the motor.

7. BASIC DESIGNATION OF MOTORS IN THE PRODUCT RANGE

Each motor in the product range is supplied with nameplate where basic information about the product and rated electrical data are stated.

Basic name plate	 <p>KONČAR ZAGREB KONČAR - MES d. d. Croatia </p> <p>Code N°</p> <p>~ Type</p> <p>kW V Hz A</p> <p>cos φ rpm</p> <p>Ta °C Cl. IP IEC/EN 60034</p>
Basic name plate for multi voltage area or ones used for Exd(e) controlled via rotational speed regulator (duty regime S9)	 <p>KONČAR ZAGREB KONČAR - MES d. d. Croatia </p> <p>Code N° kg</p> <p>~Mot</p> <p>Ta °C IC Cl. Rise IP</p> <p>Hz kW V A cos φ rpm</p> <p>© DE/NDE IEC 34, VDE0530</p>

There is following data stated on the nameplate:

- Code:** Motor number used for identification during the production process, and as a reference for ordering spare parts for the motor in the maintenance process.
- N°:** Factory motor number combined with the date of production
- ~ :** Number of motor phases(1- single phase, 3 – three phase)
- Type:** Motor type designation mark according to the explanation from the introductory part of this instructions combined with mounting arrangement (B3, B5, B14...)
- V, Hz :** Voltage and frequency of the power supply for which the motor is built, and where motor generates rated characteristics when under rated loaded stated in **kW** column
- A, min⁻¹, cos φ:** rated characteristics generated by the motor when under rated loaded stated
- To :** Environment temperature for which the motor is built, and at which it can be loaded with rated power.
- Cl :** Insulation system used in the motor (F- the highest allowed temperature 155°C, H-180°C)
- IP :** Index of protection achieved by housing and bearing shields design with regard to the harmful influence of water and dust.
- S :** Type of duty regime for which the motor is built (S1 – S10)

The last line of the name plate contains information on installed auxiliary equipment.

For single phase motors – information about installed run/start capacitors.

For motors with breaks – information about rated brake torque and voltage.

For pex motors - information about installed protective elements (PTC...).

For motors with winding heaters - information power and voltage of heaters.

For motors with forced ventilation (separate fan) – information about fan voltage and power...

For motors equipped with nameplate for multi voltage area or ones used for EExd(e) controlled via rotational speed regulator (duty regime S9), information about rotational velocity and belonging rated characteristics is entered.

On such nameplates additional information can be found:

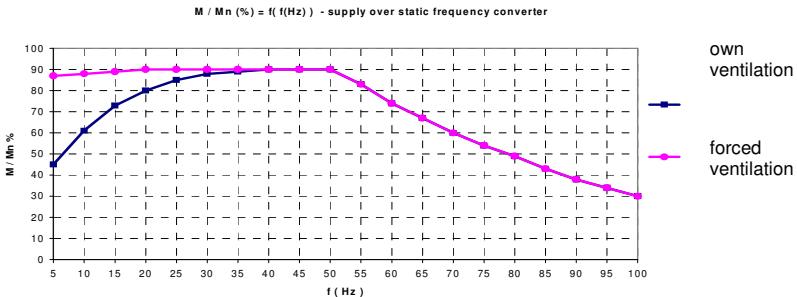
IC: type of cooling (IC411 – own ventilation, IC 410 – without ventilation...)

Rise: information about declared heating of the motor at rated conditions (B – 80K, F – 105K at the environment temperature of 40°C)

DE/NDE: information about installed bearing type

This series of motors 5/6/7/8 is designed and tested in accordance with IEC 60034-1 (line 8.5 and 8.6) and can work over the static frequency converter under conditions in accordance with IEC 60034-17 in regulation range from 5 to 60 Hz for motor polarity $2p=2$ and for other polarities in regulation range from 5 to 100 Hz with loads shown in graph 1. Motors suited for supply over static frequency converter have in their winding built-in thermal protection. The static frequency converter itself is situated outside of dangerous zone. On additional name plate are characteristic of motor for different frequency.

Graph 1. Supply over static frequency converter (permitted loads are valid for continuous work-duty S1)



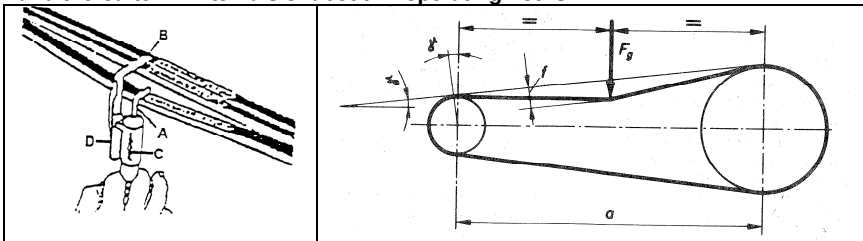
Nameplates are generally held in place by rivets on the main motor housing, and where that is not possible, they are placed on the fan cover or in case of single phase motors on the plastic box, or where readability of stated information is assured.

When ordering spare parts, most important information is Code of the motor, and of course the information about the needed spare part that needs to be replaced during repair or regular maintenance.

Along with this instructions, exploded assembly drawing with ordering information is supplied.

Inspection of the belt drive

In case of belt drive make sure to regularly inspect the belt drive during the initial operating hours. The drive belt will have to be inspected and retightened – if necessary - after an operating period of between 0.5 and 4 hours under full load and thereafter in intervals of about 24 operating hours.



Control of acquired belt tension force is carried out on the basis of its deflection caused by force F_g . To measure the deflection position the measuring gauge with the load hook A in the center of the belt run. Zero the trailing pointer. Apply the test force in accordance with scale C. For this, pull the measuring gauge at a 90 degrees angle away from the belt run. Read the depth of impression on scale D of the trailing pointer. Relation of the belt tension force F_p , pressure F_g and deflection can be expressed by the following approximate equation:

$$F_p = 0,25(a/f)F_g \cos \gamma - (10...20)N \cdot$$

Value of force F_g for belts is determined according to its cross section with keeping the deflection not smaller than $f > 0,016a$ (a – axis distance), for belts specified in table 1.

Belt Cross Section	SPZ	SPA	SPB	SPC	Y	Z	A	B	C	D	E
F_g [N]	25...27	45...50	75	125...140	13	24	40	70	120	240	360

If necessary, properly set the belt pretension until the specified depth of impression f is reached. If the drive belt is not properly tightened, the result will be an inadequate transmission of power and a premature failure of the drive belt. A too high pretension will additionally be the cause of bearing damages. When tightening the belt, make sure that the lateral alignment of the belts does not deviate by more than 1 degree

8. OPERATION & MAINTENANCE EXTRAS REGARDING EACH OF DESIGNS/SERIES/TYPICAL DESIGNATIONS

MOTORS OF SERIES/TYPICAL DESIGNATIONS 5.xAZC/AZCD (SINGLE-PHASE MOTORS)

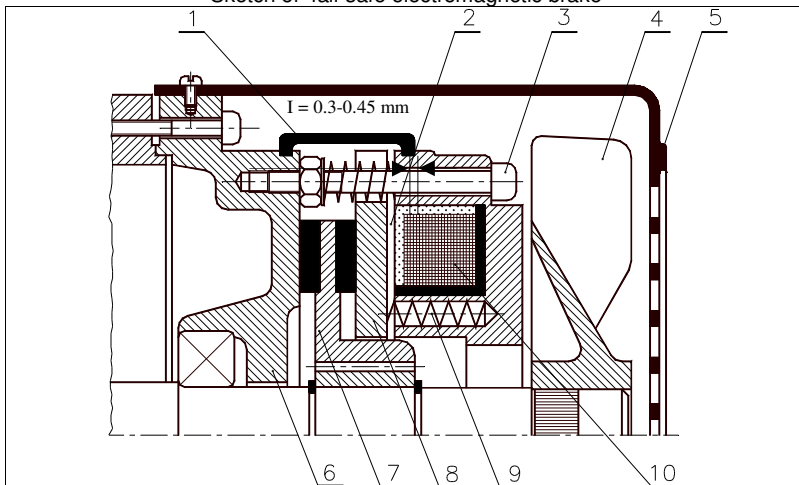
- ❖ during mounting and handling care must be taken that there will be no punching on thermoplastic terminal box (in which start and run capacitors are situated)
- ❖ mostly used winding overheat protection at single-phase motors is with bimetal thermo-switches (automatic restarting) and klixons (manual restarting)
- ❖ motors with thermal protection for automatic restarting are to be used **only there where this is permitted by security regulations in order to avoid injuries** (i.e. never at circular saws, joiners trade and grinding machines, mills, lawn movers or the like)
- ❖ it is not recommended to start single-phase motors with capacitors more than 20 times per hour for the reason of possible damage to the capacitors
- ❖ normally these motors are connected on power supply network voltage of 230V $\pm 5\%$ 50Hz by which they attain their nameplate declared ratings

**MOTORS OF SERIES/TYPE DESIGNATIONS 5.xAZK/AZPK AND 7AZK/AZPK
(WITH MOUNTED FAIL-SAFE ELECTROMAGNETIC BRAKE)**

- ❖ when connecting, the connecting instructions labeled inside of motor terminal box must be obeyed
- ❖ depending on duty request regarding the brake activation time (supply switched-off), the brake, can be connected in such way, that it's disconnecting is performed via the alternate current circuit (normal activation) or via the direct current circuit, by means of which the activating time can be shortened up to 30-40 times
- ❖ depending on available source supply, in motors can be built-in:
 - bridge rectifier when the motor is intended for delta connection (380/400 D) with earthing lead existent (rectifier is connected between phase and earthing), or for star connection (380/400 Y) where the rectifier is connected between one phase and motor star point, rectifier voltage=220/230V
 - half-wave rectifier when the motor is intended for delta connection (380/400 D) with earthing lead not existent (rectifier is connected between two phases), rectifier voltage=380/400V. Brake coil winding is in both cases for supply voltage of 190VDC
- ❖ brake with coil winding supply voltage of 24 VDC or 48VDC is connected via transformer and supply rectifier situated in the adequate switching cabinet, provided by customer, and is connected with the motor in operation via connector switch
- ❖ brake air gap is set by the manufacturer by screws (pos.3) on it's nominal value ($l = 0.3 - 0.45 \text{ mm}$)

We recommend to order as a spare part the adequate brake rectifier (pos.34) from the list of standard spares.

Sketch of fail-safe electromagnetic brake



1 Rubber cover	6 NDE shield
2 Air gap	7 Friction disc
3 Brake assembly screw	8 Armature plate
4 Fan	9 Spring
5 Fan cover	10. Brake solenoid

MOTORS OF SERIES/TYPE DESIGNATIONS 5 AND 7AT (ATP, ATPV, ABT, ABTP, ABTPV), EXPLOSION PROTECTED WITH TYPE OF PROTECTION “EXPLOSION-PROOF-d”

MOTORS OF SERIES/TYPE DESIGNATIONS 5.xAZS (ABZS), EXPLOSION PROTECTED WITH TYPE OF PROTECTION “INCREASED SAFETY-e”

MOTORS OF SERIES/TYPE DESIGNATIONS 5.x AND 7AZN (ABZN EXPLOSION PROTECTED WITH TYPE OF PROTECTION “NON SPARKING ELECTRICAL APPARATUS FOR ZONE 2-n”

For these motor series, together with these instructions, the “manufacturer’s declaration” is also issued as a proof that control and testing were performed and that motors are manufactured according to the certified documentation:

-motors must be installed and used in accordance with adequate regulations for explosion protection regarding the dangerous zones classification, areas of use and explosive groups of inflammable materials or in accordance with motor nameplate and ex-protection nameplate data. Motors with Ex-protection “d” i “n” can be power supplied via static frequency converter in conditions according to IEC 60034-17. In such case motors must have built-in thermal-protection in stator winding. For these motors along with the “Manufacturer’s statement”, “Appendix to the Manufacturer’s statement” is also issued, defining regulation range and required torque/power reduction depending on the operating conditions. In case of uncertainties, contact the manufacturer.

-motors with Ex-protection by shielding “d” intended for use in mining are not suitable for hard operating conditions areas.

-overload protection in the control box (on installations), should be adjusted according to the HRN IEC 60079-14 norm, and for motors with Ex-protection increased safety additionally, in accordance with critical heating time until reaching the allowed over-temperature of the motor for certain temperature class stated in motor type designation marking and I_M/I_N rate stated on the motor name plate.

-all motors must be equipped with appropriate cable glands in accordance with requirements of corresponding norms. For cable gland with cylindrical threading, protection against unfastening is achieved by nut on the inside of the housing, (counter-nut), or appropriate filling (i.e. LOCTITE 243). Motors are shipped from the factory without the filling, and responsibility for securing the gland against unfastening, lays on authorized personnel when installing the motor.

- Cable entry are designed with Mxx x1,5 cable glands like in table. In case when are some differens it is on name plate or declaration specified.

IEC veličina motora/ IEC motor size	Series 5AT / 7AT / 5AZS / 5AZN / 7AZN		IEC veličina motora/ IEC motor size	Series 5AT / 7AT / 5AZS / 5AZN / 7AZN	
	Broj uvodnica x Veličina uvodnice / Number of glands x gland size	Promjer priključnog kabla M(mm) / Diameter of connection cable M(mm)		Broj uvodnica x Veličina uvodnice / Number of glands x gland size	Promjer priključnog kabla M(mm) / Diameter of connection cable M(mm)
63	1 x M16x1.5	5 - 10	160	1 x M32x1.5 + čep/plug	18 - 25
71	1 x M20x1.5	6 - 12	180	1 x M40x1.5 + čep/plug	22 - 32
80	1 x M20x1.5	6 - 12	200	2 x M40x1.5	22 - 32
90	1 x M20x1.5	6 - 12	225	2 x M50x1.5	29 - 38
100	1 x M25x1.5	13 - 18	250	2 x M50x1.5	29 - 38
112	1 x M25x1.5	13 - 18	280	2 x M50x1.5	29 - 38
132	1 x M32x1.5 + čep/plug	18 - 25	315	2 x M63x1.5	34 - 44

-On motors delivered with threaded holes for attaching cable glands and thread protecting closed plastic plugs manufactured according to regulations, an authorized contractor is obliged to install certified cable glands into these holes or, if there are any extra holes, close them with certified plugs according to regulations. In addition while performing connecting; the motors have to be connected with isolated terminals.
-In case of assembly and disassembly of motors, existing mechanical protection has to be provided (use of sealing agents on contact surfaces, coating of screw joints with fillers, grease fulfilments in bearings, greasing of shaft seals...)

Specificities regarding the X-mark of EX-Agency certificate

With regard to the specificities concerning the use limitations, installation and maintenance of Ex-motors from the production range and inability to list them all here, we ask kindly the user and the personnel authorized for installing of the equipment to study the Manufacturer's statement where all limitations for the motor are stated.

Repair of these motors must be conducted by manufacturer KONČAR - MES d.d. or listed authorized repair services. In Republic of Croatia these are the ones listed in Registry of repairman under technical supervision of Ex-Agency DZNMHRH. In foreign countries these are repairman in compliance with local regulations.

Without special written permission from the manufacturer any action that has or may have influence on anti-explosion protection of the motor (during warranty period or after) is absolutely liability of the ones carrying out the procedure, especially :

- when procedures are carried out on protective systems of Ex-protection "d" motors. During such procedures it's necessary to request instructions (and dimensions) from KONČAR – MES d.d. because air gaps are smaller than ones allowed by HRN EN 60079-0,-1 norm.

- The supply cables of motors for the ambient temperature of + 60°C shall be suitable for an operating temperature equal or greater than 85°C, for ambient temperature +80°C supply cable shall be suitable for an operating temperature equal or greater than 105°C.

- The screws used for fastening of the parts of motor enclosure size 132, 160, 180 and 280 shall have a yield stress higher than 800 N/mm².

- The screws used for fastening of the parts of motor enclosure size 200, 225 and 250 shall have a yield stress higher than 1200 N/mm² for the assembly with shield and 800 N/mm² for the assembly with terminal box.

- The motor provided with the cables permanently connected, shall have these cables protected against the risk of damage due to mechanical stresses. The end connections shall be made according to one of the types of protection indicated in the EN 60079-0 / EN 61241-0 standards according to the installation rules in force in site of installation.

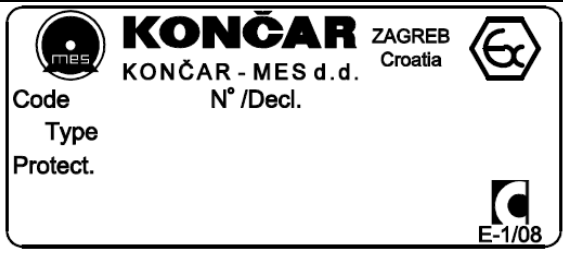

-Motor is built in compliance with IEC 60034-17, so it is capable to work with power supply from frequency converter (2p=2; 5 to 87 Hz and 2p=4, 6, 8; 5 to 100 Hz).

According to IEC 60034-11 for motor winding there are according to temperature class (T4) 3xPTC-130°C or (T3)150°C ± 5°C sensors. Characteristics of thermal sensors are in compliance with DIN 44081/44082. Speed regulation range is defined by data stated on motor name plate, and given torque reduction diagram defines or torque and power. Frequency converter used for this drive must be in compliance with IEC 60034-17 for protection of over voltage and from voltage gradient change. Protection from short-circuit of any kind (to phase, to earth) must be provided inside frequency converter device.

Designation of motors with Ex-protection

Every motor with Ex-protection, along with basic nameplate according to paragraph 7. of this instructions, has on it's housing additional plate with information about type of anti-explosive protection.

Motors with Ex-protection “shielding – EExd”, “increased safety – EExe” nameplate and Motors with Ex-protection “non-sparking electrical apparatus - EExnA”

<p>Nameplate for Exd(e) motors, ExnA motors and Exe motors with Ex – Agency certificate</p>	
<p>Nameplate for Exd(e) motors, ExnA motors and Exe motors with CESI certificate</p>	

There is following data stated on the nameplate:

Code: Motor number used for identification during the production process, and as a reference for ordering spare parts for the motor in the maintenance process.

N⁰: Factory motor number

Type: Type designation of the motor

Protection: Type of anti-explosion protection

Additionally for motors with Ex-protection “increased safety – e”

I_A/I_N: ratio of short circuit current and rated current of the motor

t_E: time period in which a device must disconnect the motor from the mains, and during that period no part of electrical appliance surface shall reach the temperature of the stated temperature class.

9. POSSIBLE FAILURES AND INTERFERENCES AT WORK OF SQUIRREL-CAGE INDUCTION MOTORS AND THEIR REMEDYING

FAILURE / INTERFERENCE SYMPTOMS	POSSIBLE CAUSE	HOW TO CURE / REMEDY
Motor cannot run up, no noise at all or the humming is strong	<ul style="list-style-type: none"> -Supply interrupted, one of feeder lead broke, lines broke, for example one over the fuse -Stator winding circuit interrupted, disconnection in Y/D switch, motor protection fallen out -Damaged bearings -Improper connecting -Main or auxiliary phase interrupted -Damaged capacitor (motor runs up if pushed per hand) -Damaged centrifugal switch -Klixon off or damaged 	<ul style="list-style-type: none"> -Check fuses, motor switch or contactor or protection circuit breaker... -Separate supply leads, check the winding on terminal plate terminals, check the elements of electrical protection -Change the bearings -Connect the motor acc. to appropriate instructions -Winding repair or change -Change capacitor -Centrifugal switch repair or change -Klixon on - or must be exchanged
Motor cannot accelerate under load, or accelerate hardly, sudden drop of rotational speed under load	<ul style="list-style-type: none"> -Load torque too high (overload) -Motor intended for D connection, but Y connected -Supply voltage too low -Faulty feeder lead -Rotor squirrel stick or short-circuit ring interrupted 	<ul style="list-style-type: none"> -Must be in accordance with motor frame size -Apply the regular way of motor connecting -Stabilize the supply voltage -Check the supply rightness -Change the rotor
At start, fuse blows or protection circuit breaker switches-off	<ul style="list-style-type: none"> -Feeder leads from motor switch to motor are in short circuit -Two phases of stator winding are in short circuit or earth connected -Wrongly chosen/adjusted motor protection 	<ul style="list-style-type: none"> -Separate and insulate the leads -Separate the motor from supply probably it is necessary to be rewound -Choose/adjust motor protection properly
Motor warming in operation is high scraping noises , motor protection is switching-off after some time	<ul style="list-style-type: none"> -Motor overload (at single phase motors klixon is witching-off) -Too high or too low supply voltage -Too high motor switching-on intensity -Motor work on single phase -Rotor scraps on to stator 	<ul style="list-style-type: none"> -Measure the motor current. If it is far too high in comparison to the rated one, cure the overload cause -Stabilize the supply voltage -Lower the switching-on intensity -Check supply leads -Rotor or motor need to be repaired
Motor warming is high even under no load, pulls high current, humms, (1ph motors - thermal protection is switching-off)	<ul style="list-style-type: none"> -Wrong stator winding connection -Supply voltage to high -Insufficient cooling -Short circuit between winding coils or motor mass 	<ul style="list-style-type: none"> -Connect motor properly acc. to nameplate data and appropriate instructions -Stabilize the supply voltage -Assure undisturbed air flow to and around the motor -Change of winding
Motor in operation causes increased and abnormal noise	<ul style="list-style-type: none"> -Electrical reasons -Bearing damage -Damage in gearbox mounted on -Rotor unbalanced -Insufficient fixing on the ground or flange -Friction disc scraps 	<ul style="list-style-type: none"> -Consult the manufacturer -Change the bearings -Check the gearbox -Rebalance dynamically the rotor of drive -Tighten the appropriate screws with adequate torque -Check the air gap or wear-off of friction disc lining

10. WORKING LIFE OF MOTORS MANUFACTURED BY KONČAR-MES d.d.

- under normal conditions of use foreseen by these operation & maintenance instructions and with regular maintenance the motor working life is more longer
- The manufacturer assures the availability of spare parts in the period of time up to 7 years including also the period of time under which the warranty is valid. Service at manufacturer is possible also for products older than 7 years with special contracting conditions
- All production documentation is available 10 years after the production cease date of the particular type
- za pakiranje koristimo ekološke materijale koji se bez opasnosti po okoliš ponovo prerađuju (recikliraju), deponiraju ili uništavaju. U tu svrhu i ambalažni materijali su odgovarajuće označeni.
- Kada prestanete koristiti elektromotor pazite da ne bude teret okolišu. Predajte ga ovlaštenim sakupljačima.

11. WARRANTY CLAIMS

Breakdowns in duty or damages detected on products prior to the expiry of warranty need to be, if they are induced with material faults or bad manufacturing quality, reported to manufacturer " **KONČAR - MES d.d.** " indicating the following data :

- exact motor nameplate data (type description and code number)
- how was the motor connected while in operation
- characteristics of the drive
- how deficiency/fault appeared (the appearance art of the fault)

Breakdowns in duty or damages due to inadequate use and careless transportation / storage / connecting, **are not considered as justified warranty claims** during period of warranty. The same is valid also if the product, before it's return to the manufacturer, was disassembled during period of warranty.

12. DECLARATION OF WARRANTY

Quality managing system introduced in **KONČAR –MES d.d.** is certified in accordance to the requests stated in **ISO 9001** standard. Based on this, the regular work of our products is assured with rigorous process control and final inspection before dispatch to the customer, on ground of which the warranty is issued. If despite of this, irregular operation or disturbance in duty, caused with bad manufacturing quality or material fault appears, we oblige ourselves to cover all repair/correction costs and that guaranteed regularity of product will be established again.

Warranty is valid **12 months** from the day of product sale/takeover, what is testified with salesman's stamp, datum and signature on warranty leaflet and attached invoice.

The customer is obliged to follow the operation and maintenance instructions attached to every motor which bears the **KONČAR –MES d.d.** manufacturer's logo.

We cover the transportation costs regarding the necessary warranty service repair, on basis of properly issued invoice according to valid railway or postal charges from outgoing railway or postal station.

If, during the period of warranty, repair work will consume more than 10 days counting from the day of reclamation report/motor return, the date of warranty expiry will be postponed for the same number of days the repair work actually took.

If the repair work is not executed during 45 days counting from the day of report/return, or it is impossible to remedy the fault, we will exchange the product with a new one. The faults **that did not occur due to material faults or bad manufacturing quality** are **not considered** as manufacturer's faults, and therefore induced costs of their repair/correction are liability of the buyer of product according to valid **KONČAR-MES d.d.** manufacturer's pricelist.

The repairs during and beyond from warranty period are performed by **KONČAR-MES d.d.** HR-10001, Zagreb, Fallerovo šetalište 22, Republic of Croatia.

Mr. proizvođač/We, the manufacturer:

KONČAR - MES d.d.

Fallerovo šetaliste 22, PP 202
10002 Zagreb, Republic of Croatia

izjavljujemo i potvrđujemo pod punom odgovornošću da su naši proizvodi: / *Declare herewith that our products:*

IEC

JEDNOFAZNI I TROFAZNI NISKO NAPONSKI ASINKRONI KAVEZNI MOTORI

Serijska i veličina 5 AZC 63-112, 5 AZCD 63-112, 5 AZ 56-160, 7 AZ 132-315 i 8 AZ 132-315
jednobrzinski, višebrzinski i s prigrađenim elektromagnetskim kočnicama

IEC

SINGLE PHASE AND THREE PHASE LOW VOLTAGE SQUIRREL CAGE INDUCTION MOTORS

Series and size 5AZC 63-112, 5AZCD 63-112, 5AZ 56-160, 7AZ 132-315 and 8AZ 132-315
single speed, multi speed and with adapted electromagnetic brakes

konstruirani prema važećim Zakonima, normama i propisima, a provedenim ispitivanjima utvrđena je njihova sukladnost s navedenim:

designed according to valid Laws, standards and regulations, and by conducted tests ensured to compile to following European Council's Directives :

Zakon o općoj sigurnosti proizvoda (NN 158/03),

89/392 EC (MD) +AMAND 98/37 + 93/68

Zakon o tehničkim zahtjevima za proizvode i ocjena sukladnosti (NN 158/03),
Pravilnik o sigurnosti strojeva (NN 135/05),

Pravilnik o električnoj opremi namijenjenoj za uporabu unutar određenih naponskih granica (NN 135/05),

73/23/EC+ AMAND 93/68 (LVD) (2006/95/EC)

Pravilnik o elektromagnetskoj kompatibilnosti (NN 16/05),

(89/336/EC)(EMC) 2004/10/EC

i normama/standards

IEC 60034-1		Electrical rotating machines – part 1: ratings and performance
IEC 60034-5	EN 60034-5	Electrical rotating machines – part 5: degrees of protection provided by the integral design of rotating electrical machines (IP code): classification
IEC 60034-6	EN 60034-6	Electrical rotating machines – part 6: methods of cooling (IC code)
IEC 60034-7	EN 60034-7	Electrical rotating machines – part 7: classification of types of constructions, mounting, arrangements and terminal box position (IC code)
IEC 60034-8	EN 60034-8	Electrical rotating machines – part 8: terminal markings and direction of rotation
IEC 60034-9	EN 60034-9	Electrical rotating machines – part 9: noise limits
IEC 60034-11	EN 60034-11	Electrical rotating machines – part 11: thermal protection
IEC 60034-12	EN 60 034-12	Electrical rotating machines – part 12: starting performance of single-speed three-phase cage induction motors
IEC 60034-14	EN 60 034-14	Electrical rotating machines – part 14: mechanical vibrations of certain machines with shaft heights 56 mm and higher - Measurement evaluation and limits of vibration severity
IEC 60036	EN 60 034-14	IEC standard voltages
IEC 60072		Cylindrical shaft ends, electrical rotating machines
IEC 60072-1		Dimensions and Output Series for Rotating Electrical Machines Part 1: Frame Numbers 56 to 400 and Flange Numbers 55 to 1080
IEC 60085	EN 60085	Electrical insulation – Thermal evaluation and designation
IEC 60529	EN 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60721-2-1		Classification of environmental conditions Part 2-1: Environmental conditions appearing in nature Temperature and humidity
IEC 60892		Effects of unbalanced voltages on the performance of 3-phase cage induction motors
ISO 281		Rolling bearings – Dynamic load ratings and rating life
IEC 1680	EN 21680	Acoustics – Test code for measuring airborne noise emitted by electrical rotating machines
ISO 8821		Mechanical vibration – Balancing – Shaft and fitment key convention
	EN 50102	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
	EN 50081-1	Electromagnetic compatibility generic emission standard – part 1 : residential, commercial and light industrial
	EN 50081-2	Electromagnetic compatibility generic emission standard – part 2 : industrial
	EN 50082-1	Electromagnetic compatibility generic immunity standard – part 1 : residential, commercial and light industrial
	EN 55014	Limits and methods of measurement of radio disturbance characteristics of household electrical appliances, portable tools and similar electrical apparatus

Izjava o sukladnosti je izrađena u skladu sa modulom za ocjenu: A (unutrašnja kontrola proizvodnje)/
This certificate of conformity is according to module A: Internal production control

Odgovorna osoba proizvođača/ Responsible person of the manufacturer:

Šimun Ercegovac, dipl. ing.

MP
KONČAR - MALI ELEKTRIČNI STROJEVI d.d.
Zagreb, Fallerovo šetaliste 22

Potpis/signature:



Zagreb, 26.05.2008.

MES OB 05.01.1 05.2008

Uputa za naručivanje

Svi standardni dijelovi navedeni u gornjoj tabeli razlikuju se prema tipu motora, veličini, seriji te mogućim specijalnostima .

Radi točnog određivanja istih, molimo u narudžbi navesti slijedeće :

- ❖ pozicija i naziv rezervnog dijela prema rastavnom crtežu i tabeli
 - ❖ tipaska oznaka motora
 - ❖ kodni broj motora
- } s natpisne pločice motora

Primjer:

Poz. 5 Ventilator
5.5AZS 71B-2/T3 ; B3
A500201

Ordering guideline

All above listed standard spare parts differ between each other depending upon the type of motor, frame size, series and possible peculiarities.

To allow us to pinpoint them exactly, please assure when ordering, that the following data are available:

- ❖ name and position number of the spare part according to the above list and exploded view
 - ❖ type designation of the motor
 - ❖ motor code number
- } from the motor name plate

Example:

Pos. 5 Fan
5.5AZS 71B-2/T3 ; B3
A500201

EN/IEC
trofazni motori potpuno zatvorene izvedbe
tipskih oznaka
AZ, AZN, AZH, AZP, AZPV, ABZ, ABZH, ABZP i ABZPV
u veličinama
56 – 160 (serija 5.x i 6)
132 – 315 (serija 7 i 8)

EN/IEC
Three phase cage induction motors
type designation
AZ, AZN, AZH, AZP, AZPV, ABZ, ABZH, ABZP i ABZPV
sizes
56 – 160 (series 5.x and 6)
132 – 315 (series 7 and 8)

Poz./Pos.	Naziv	Name
1	Stator komplet	Wound stator
2	Rotor (uravnotežen polu-klinom)	Rotor (half- key balanced)
3	Ležajni štít prednji - B3, B5, B14	DE shield - B3, B5, B14
4	Ležajni štít stražnji	NDE shield
5	Ventilator	Fan
6	Ventilatorska kapa	Fan cover
7	Priključna pločica	Terminal block
8	Brtva ormarića	Terminal box seal
9	Ormarić	Terminal box
10	Brtva poklopca ormarića	Terminal box lid seal
11	Poklopac ormarića	Terminal box lid
12	Poklopac	Lid
13	Brtvena uvodnica	Cable gland
14	Čep	Plug
15	Ležaj PS	Bearing DE
15.1	Ležaj SS	Bearing NDE
16	Ležajna opruga	Resilient preloading ring
17	Prstenasti uskočnik	Circlip
18	Klin osovine	Shaft key
18.1	Klin osovine 2SKV	Shaft key NDE
19	Osovinsko brtvilo PS	DE shaft seal
19.1	SS V - osovinsko brtvilo (200-250)	NDE shaft seal (200-250)
20	Desna noga	Frame foot, right
21	Lijeva noga	Frame foot, left
22	Vijčana karika	Lifting ring

Trofazni motori EN/IEC veličine :

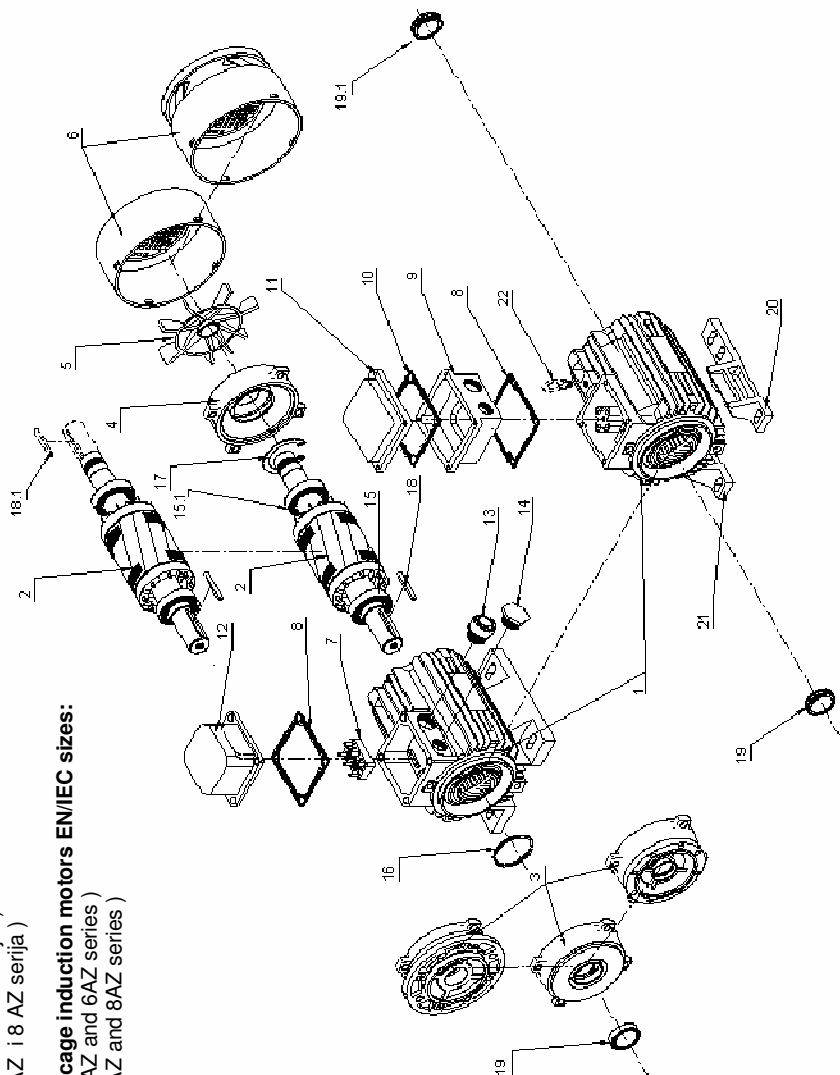
56 - 160 (5.xAZ i 6AZ serija)

132 - 315 (7AZ i 8AZ serija)

Three phase cage induction motors EN/IEC sizes:

56 - 160 (5.xAZ and 6AZ series)

132 - 315 (7AZ and 8AZ series)



EN/IEC
jednofazni motori potpuno zatvorene izvedbe
serija / tipskih oznaka

5.x AZC 63 – 112
5.x AZCD 71 – 112

Jednofazni motori IEC veličine **63-112 (5.xAZC serija), 71-112 (5.xAZCD serija) :**

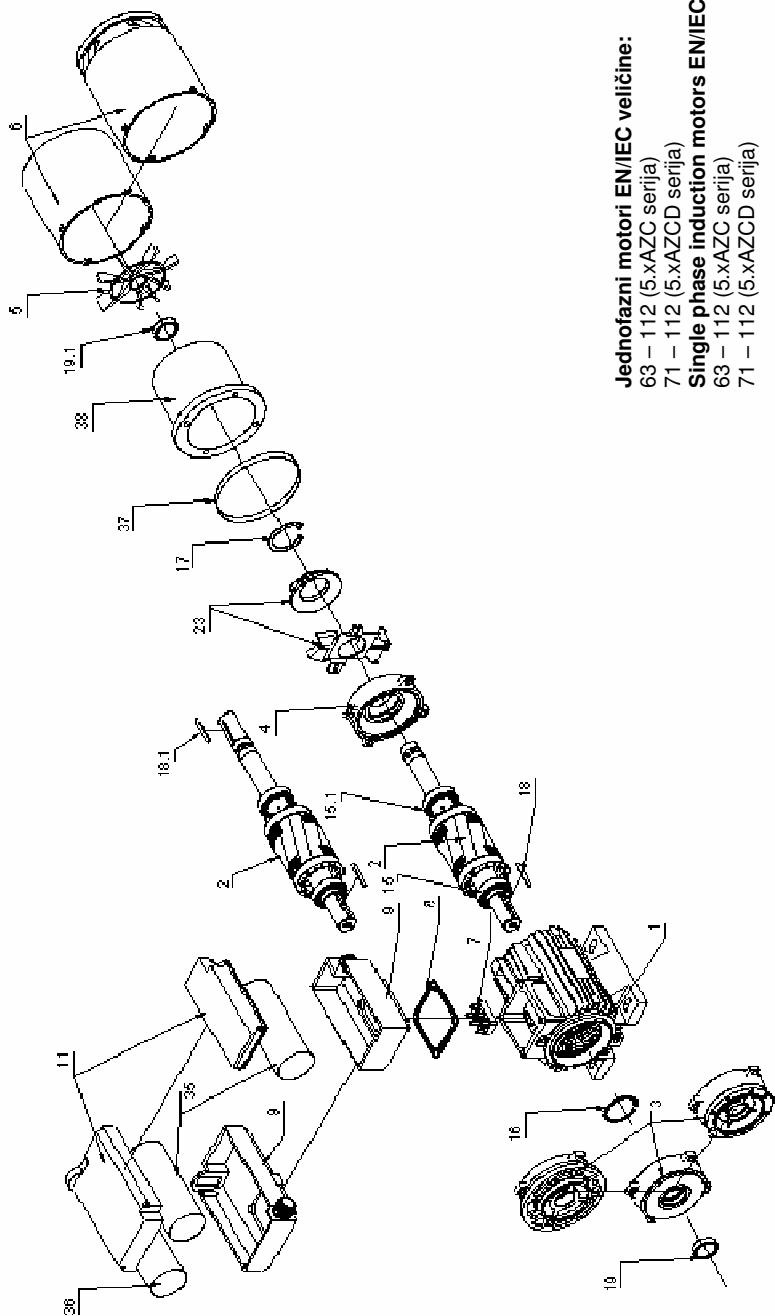
EN/IEC
Single phase induction motors
series / type designation

5.x AZC 63 – 112
5.x AZCD 71 – 112

Single phase induction motors IEC sizes **63-112 (5.xAZC series), 71-112 (5.xAZCD series) :**

Poz./Pos.	Naziv	Name
1	Stator komplet	Wound stator
2	Rotor (uravnotežen polu-klinom)	Rotor (half - key balanced)
3	Ležajni štiti prednji – B3, B5, B14	DE shield - B3, B5, B14
4	Ležajni štiti stražnji AZC ili AZCD	NDE shield AZC or AZCD
5	Ventilator	Fan
6	Ventilatorska kapa	Fan cover
7	Priključna pločica	Terminal block
8	Brtva ormarića	Terminal box seal
9*	Ormarić 5AZC ili 5AZCD	Terminal box 5AZC or 5AZCD
11	Poklopac 5AZC ili 5AZCD	Terminal box lid 5AZC or 5AZCD
15	Ležaj PS	Bearing DE
15.1	Ležaj SS	Bearing NDE
16	Ležajna opruga	Resilient preloading ring
17	Prstenasti uskočnik	Circlip
18	Klin osovine	Shaft key
18.1	Klin osovine 2SKV	Shaft key NDE
19	Osovinsko brtvilo PS	DE radial shaft seal
19.1	SS V - osovinsko brtvilo	NDE radial shaft seal
23	Centrifugalna sklopka (rotor+stator)	Centrifugal switch (rotor+ stator)
35	Kondenzator za trajni rad	Run capacitor
36	Zaletni kondenzator	Start capacitor
37	O - brtveni prsten poklopca CFG sklopke	O-seal for centrifugal switch
38	Poklopac CFG sklopke	Centrifugal switch cover

Opaska : * priključni ormarić isporučuje se sa brtvenom uvodnicom
Remarks : * terminal box is delivered with cable gland



Jednofazni motori EN/IEC veličine:

63 – 112 (5.xAZC serija)

71 – 112 (5.xAZCD serija)

Single phase induction motors EN/IEC size:

63 – 112 (5.xAZC serija)

71 – 112 (5.xAZCD serija)

EN/IEC

trofazni motori potpuno zatvorene izvedbe sa prigradenom elektromagnetskom kočnicom

tipskih oznaka AZK, AZHK, AZPK, ABZK, ABZHK i ABZPK u veličinama

63 – 160 (serija 5.x)

112 – 315 (serija 7)

Trofazni motori s prigradenom elektromagnetskom kočnicom IEC veličine **63 – 160 (5.xAZK serija)** i **112 – 280 (7AZK serija)** :

EN/IEC

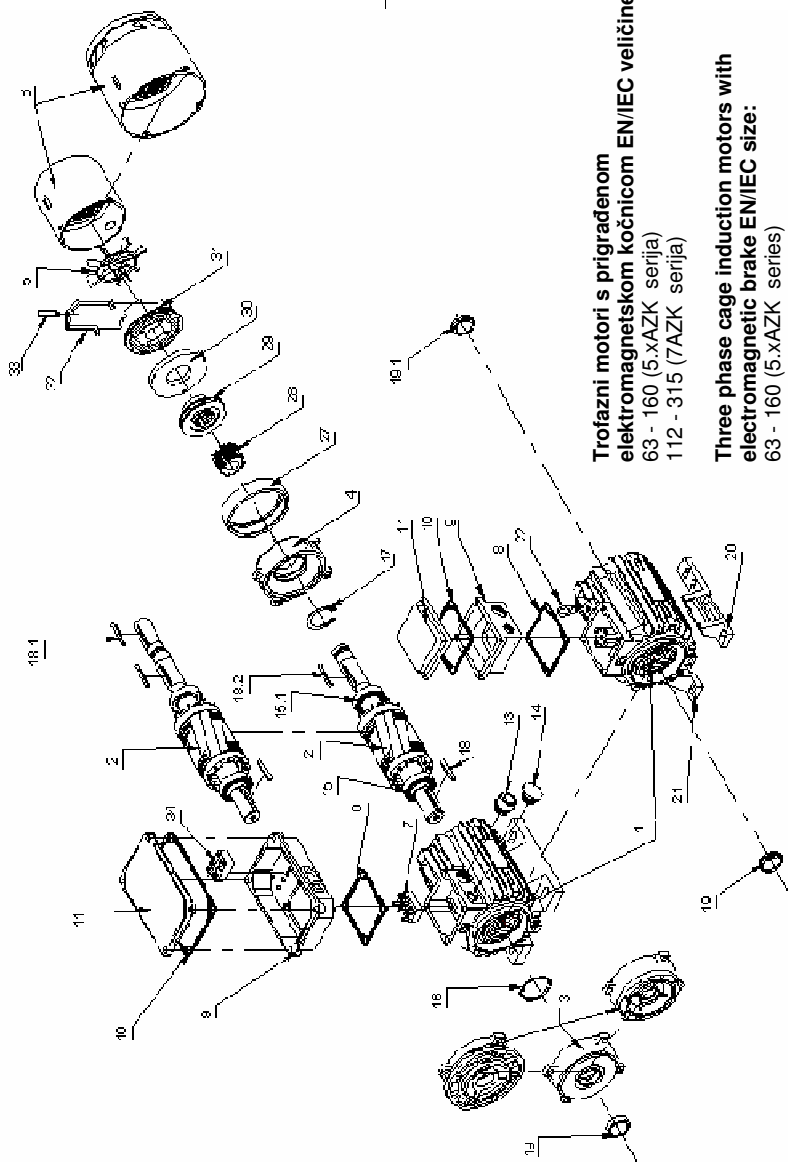
Three phase cage induction motors with electromagnetic brake type designation AZK, AZHK, AZPK, ABZK, ABZHK i ABZPK sizes

63 – 160 (serija 5.x)

112 – 315 (serija 7)

Three phase cage induction motors with electromagnetic brake IEC size **63 – 160 (5.xAZK series)** and **112 – 315 (7AZK series)** :

Poz/Pos	Naziv	Name
1	Stator komplet	Wound stator
2	Rotor (uravnotežen polu-klinom)	Rotor (half - key balanced)
3	Ležajni štiti prednji - B3, B5, B14	DE shield - B3, B5, B14
4	Ležajni štiti stražnji	NDE shield
5	Ventilator	Fan
6	Ventilatorska kapa	Fan cover
7	Priključna pločica	Terminal block
8	Brtva ormarića	Terminal box seal
9	Ormarčić	Terminal box
10	Brtva poklopca ormarića	Terminal box lid seal
11	Poklopac ormarića	Terminal box lid
13	Brtvena uvodnica	Cable gland
14	Čep	Plug
15	Ležaj PS	Bearing DE
15.1	Ležaji SS	Bearing NDE
16	Ležajna opruga	Resilient preloading ring
17	Prstenasti uskočnik	Circlip
18	Klin osovine	Shaft key
18.1	Klin osovine 2 SKV	Shaft key NDE
18.2	Klin za ozublenu glavinu	Shaft key for toothed hub
19	Osovinsko brtvilo PS	DE Shaft seal
19.1	SS V - osovinsko brtvilo	NDE shaft seal
20	Desna noga	Frame foot, right
21	Lijeva noga	Frame foot, left
22	Vijčana karika	Lifting ring
27	Zaštitna guma	Rubber cover
28	Ozubljeni glavinu	Toothed hub
29	Kočioni disk	Friction disc
30	Potisna ploča	Armature plate
31	Elektromagnet kočnice	Brake magnet
32	Viljuška za otpuštanje	Hand release fork
33	Poluga za otpuštanje	Hand release bar
34	Ispravljač	Rectifier



**Trofazni motori s prigradenom
elektromagnetskom kočnicom EN/IEC veličine:
63 - 160 (5.xAZK serija)
112 - 315 (7AZK serija)**

**Three phase cage induction motors with
electromagnetic brake EN/IEC size:
63 - 160 (5.xAZK series)
112 - 315 (7AZK series)**

EN/IEC
trofazni motori u PEX- zaštiti oklapanje “ d “
tipskih oznaka
AT, ATP, ATPV, ABT, ABTP, ABTPV
u veličinama
71 – 112 (serija 5)
132 – 315 (serija 7)
Trofazni motori u pex- zaštiti oklapanje “ d “ EN/IEC veličina
71-112 (5AT serija), 132-315 (7AT serija) :

EN/IEC
Three phase cage induction explosion-proof motors shielding “d”
type designation
AT, ATP, ATPV, ABT, ABTP, ABTPV
sizes
71 – 112 (series 5)
132 – 315 (series 7)
Three phase cage induction explosion-proof motors shielding “d” protection EN/IEC
sizes:
71-112 (5AT series), 132-315 (7AT series) :

Poz/Pos	Naziv	Name
1	Stator komplet	Wound stator
2	Rotor (uravnotežen polu-klinom)	Rotor (half-key balanced)
3	Ležajni štiti prednji - B3, B5, B14	DE shield - B3, B5, B14
4	Ležajni štiti stražnji	NDE shield
5	Ventilator	Fan
6	Ventilatorska kapa	Fan cover
7	Provodni izolatori	Bushing insulators
8	O - brtveni prsten ormarića	Terminal box O-seal
9	Ormarić	Terminal box
10	O - brtveni prsten poklopca ormarića	Terminal box lid O-seal
11	Poklopac ormarića	Terminal box lid
12	Poklopac	Lid
13	Brtvena uvodnica	Cable gland
13.1	Kabelski adapter	Cable adapter
14	Čep	Plug
15	Ležaj PS	Bearing DE
15.1	Ležaj SS	Bearing NDE
16	Ležajna opruga	Resilient preloading ring
17	Prstenasti uskočnik	Circlip
18	Klin osovine	Shaft key
18.1	Klin osovine 2 SKV	Shaft key NDE
20	Desna noga	Frame foot, right
21	Lijeva noga	Frame foot, left
22	Vijčana karika	Lifting ring
26	Dvostruki navojnik	Fixing bolt

Trofazni motori u pex zaštiti oklopanje "d"

EN/IEC veličine:

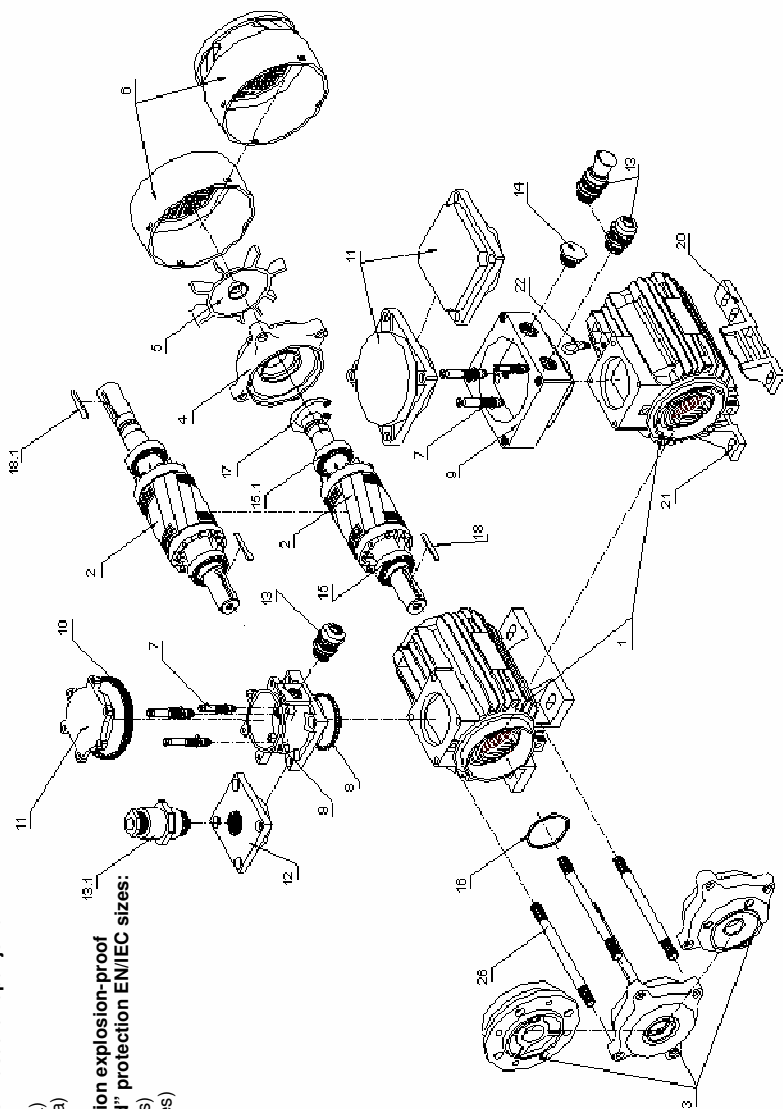
71 – 112 (5AT serija)

132 – 315 (7AT serija)

Three phase induction explosion-proof
motors shielding "d" protection EN/IEC sizes:

71 – 112 (5AT series)

132 – 315 (7AT series)



EN/IEC
trofazni motori u PEX- zaštiti povećana sigurnost " e "
tipskih oznaka
AZS , ABZS
u veličinama

63 – 112 (serija 5.x)

Trofazni motori u pex- zaštiti povećana sigurnost " e " EN/IEC veličina
63-112 (5.xAZS serija) :

EN/IEC
Three phase cage induction explosion-proof motors increased safety "e"
protection:
type designations
AZS , ABZS
sizes

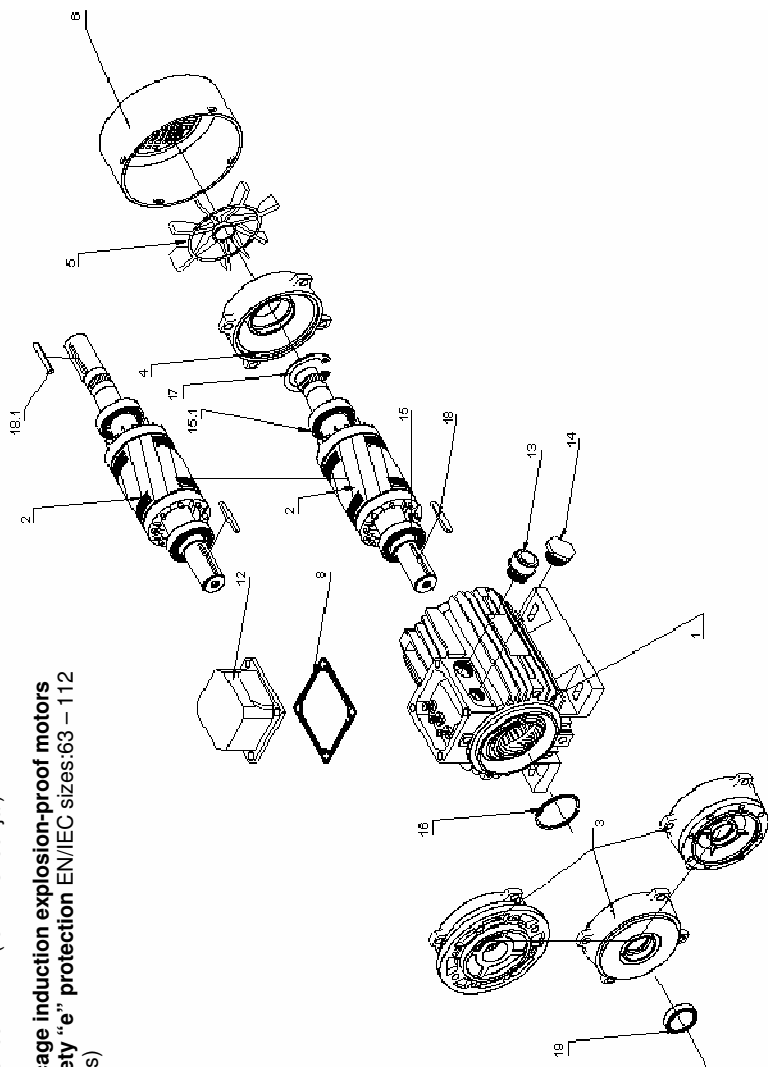
63 – 112 (series 5.x)

Three phase cage induction explosion-proof motors increased safety "e" EN/IEC
size 63-112 (5.xAZS series):

Poz. /Pos.	Naziv	Name
1	Stator komplet sa zalivenim priključcima	Wound stator with compounded terminals
2	Rotor (uravnotežen poluklinom)	Rotor (half-key balanced)
3	Ležajni štiti prednji - B3, B5, B14	DE shield - B3, B5, B14
4	Ležajni štiti stražnji	NDE shield
5	Ventilator	Fan
6	Ventilatorska kapa	Fan cover
7	Priključna pločica	Terminal Block
8	Brtva ormarića	Terminal box seal
9	Ormarić	Terminal box
12	Poklopac	Terminal box lid
13	Brtvena uvodnica	Cable gland
14	Čep	Plug
15	Ležaj PS	Bearing DE
15.1	Ležaj SS	Bearing NDE
16	Ležajna opruga	Resilient preloading ring
17	Prstenasti uskočnik	Circlip
18	Klin osovine	Shaft key
18.1	Klin osovine 2 SKV	Shaft key for 2 nd DE
19	Osovinsko brtvilo PS	DE radial shaft seal

Trofazni motori u pex-zaštiti povećana sigurnost "e"
EN/IEC veličine :63 – 112 (5.xAZS serija)

Three phase cage induction explosion-proof motors
increased safety "e" protection EN/IEC sizes:63 – 112
(5.xAZS series)





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MOTOR**

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~	TYPE		
kW		IM	
V		Hz	IP

Pečat i potpis / Stamp and signature:



Datum prodaje / Date of sale:



Pečat i potpis prodavatelja / Salesman's stamp and signature:

