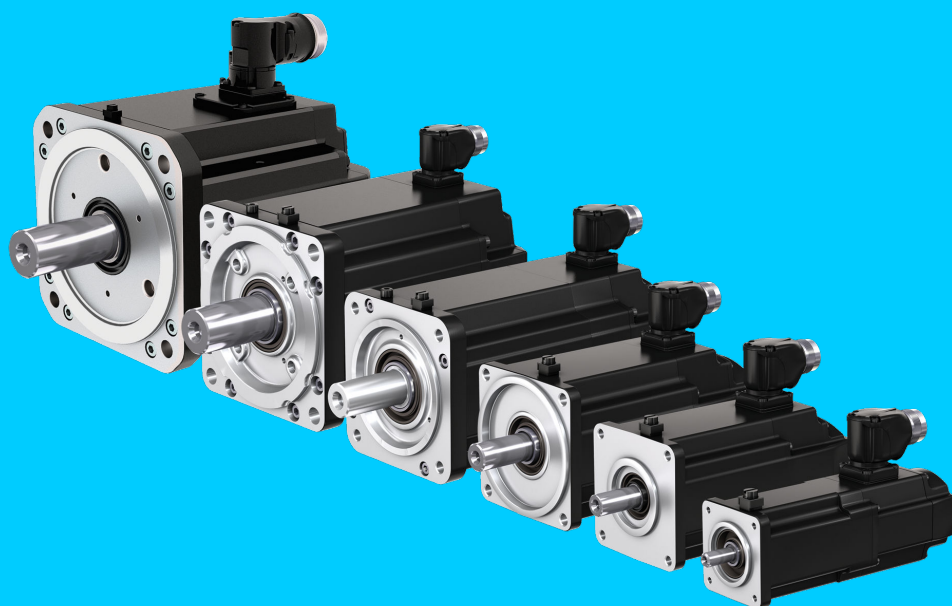


# MS2E Synchronous Servomotors

ATEX



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## **Liability**

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# Supplemental directives

| Deutsch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Français                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <p><b>▲ WARNUNG</b> Lebensgefahr bei Nichtbeachtung der nachstehenden Sicherheitshinweise!</p> <p>Nehmen Sie die Produkte erst dann in Betrieb, nachdem Sie die mit dem Produkt gelieferten Unterlagen und Sicherheitshinweise vollständig durchgelesen, verstanden und beachtet haben.</p> <p>Sollten Ihnen keine Unterlagen in Ihrer Landessprache vorliegen, wenden Sie sich an Ihren zuständigen Rexroth-Vertriebspartner.</p> <p>Nur qualifiziertes Personal darf an Antriebskomponenten arbeiten.</p> <p>Nähere Erläuterungen zu den Sicherheitshinweisen entnehmen Sie Kapitel 1 dieser Dokumentation.</p> | <p><b>▲ WARNING</b> Danger to life in case of non-compliance with the below-mentioned safety instructions!</p> <p>Do not attempt to install or put these products into operation until you have completely read, understood and observed the documents supplied with the product.</p> <p>If no documents in your language were supplied, please consult your Rexroth sales partner.</p> <p>Only qualified persons may work with drive components.</p> <p>For detailed explanations on the safety instructions, see chapter 1 of this documentation.</p> | <p><b>▲ AVERTISSEMENT</b> Danger de mort en cas de non-respect des consignes de sécurité figurant ci-après !</p> <p>Ne mettez les produits en service qu'après avoir lu complètement et après avoir compris et respecté les documents et les consignes de sécurité fournis avec le produit.</p> <p>Si vous ne disposez pas de la documentation dans votre langue, merci de consulter votre partenaire Rexroth.</p> <p>Seul un personnel qualifié est autorisé à travailler sur les composants d'entraînement.</p> <p>Vous trouverez des explications plus détaillées relatives aux consignes de sécurité au chapitre 1 de la présente documentation.</p> |
| <p><b>▲ WARNUNG</b> Hohe elektrische Spannung! Lebensgefahr durch elektrischen Schlag!</p> <p>Betreiben Sie Antriebskomponenten nur mit fest installiertem Schutzleiter.</p> <p>Schalten Sie vor Zugriff auf Antriebskomponenten die Spannungsversorgung aus.</p> <p>Beachten Sie die Entladezeiten von Kondensatoren.</p>                                                                                                                                                                                                                                                                                        | <p><b>▲ WARNING</b> High electrical voltage! Danger to life by electric shock!</p> <p>Only operate drive components with a permanently installed equipment grounding conductor.</p> <p>Disconnect the power supply before accessing drive components.</p> <p>Observe the discharge times of the capacitors.</p>                                                                                                                                                                                                                                         | <p><b>▲ AVERTISSEMENT</b> Tensions électriques élevées ! Danger de mort par électrocution !</p> <p>N'exploitez les composants d'entraînement que si un conducteur de protection est installé de manière permanente.</p> <p>Avant d'intervenir sur les composants d'entraînement, coupez toujours la tension d'alimentation.</p> <p>Tenez compte des délais de décharge de condensateurs.</p>                                                                                                                                                                                                                                                             |
| <p><b>▲ WARNUNG</b> Gefährbringende Bewegungen! Lebensgefahr!</p> <p>Halten Sie sich nicht im Bewegungsbereich von Maschinen und Maschinenteilen auf.</p> <p>Verhindern Sie den unbeabsichtigten Zutritt für Personen.</p> <p>Bringen Sie vor dem Zugriff oder Zutritt in den Gefahrenbereich die Antriebe sicher zum Stillstand.</p>                                                                                                                                                                                                                                                                             | <p><b>▲ WARNING</b> Dangerous movements! Danger to life!</p> <p>Keep free and clear of the ranges of motion of machines and moving machine parts.</p> <p>Prevent personnel from accidentally entering the range of motion of machines.</p> <p>Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.</p>                                                                                                                                                                                                | <p><b>▲ AVERTISSEMENT</b> Mouvements entraînant une situation dangereuse ! Danger de mort !</p> <p>Ne séjournez pas dans la zone de mouvement de machines et de composants de machines.</p> <p>Évitez tout accès accidentel de personnes.</p> <p>Avant toute intervention ou tout accès dans la zone de danger, assurez-vous de l'arrêt préalable de tous les entraînements.</p>                                                                                                                                                                                                                                                                         |
| <p><b>▲ WARNUNG</b> Elektromagnetische / magnetische Felder! Gesundheitsgefahr für Personen mit Herzschrittmachern, metallischen Implantaten oder Hörgeräten!</p> <p>Zutritt zu Bereichen, in denen Antriebskomponenten montiert und betrieben werden, ist für oben genannten Personen untersagt bzw. nur nach Rücksprache mit einem Arzt erlaubt.</p>                                                                                                                                                                                                                                                            | <p><b>▲ WARNING</b> Electromagnetic / magnetic fields! Health hazard for persons with heart pacemakers, metal implants or hearing aids!</p> <p>The above-mentioned persons are not allowed to enter areas in which drive components are mounted and operated, or rather are only allowed to do this after they consulted a doctor.</p>                                                                                                                                                                                                                  | <p><b>▲ AVERTISSEMENT</b> Champs électromagnétiques / magnétiques ! Risque pour la santé des porteurs de stimulateurs cardiaques, d'implants métalliques et d'appareils auditifs !</p> <p>L'accès aux zones où sont montés et exploités les composants d'entraînement est interdit aux personnes susmentionnées ou bien ne leur est autorisé qu'après consultation d'un médecin.</p>                                                                                                                                                                                                                                                                     |
| <p><b>▲ VORSICHT</b> Heiße Oberflächen (&gt; 60 °C)! Verbrennungsgefahr!</p> <p>Vermeiden Sie das Berühren von metallischen Oberflächen (z. B. Kühlkörpern). Abkühlzeit der Antriebskomponenten einhalten (mind. 15 Minuten).</p>                                                                                                                                                                                                                                                                                                                                                                                 | <p><b>▲ CAUTION</b> Hot surfaces (&gt; 60 °C [140 °F])! Risk of burns!</p> <p>Do not touch metallic surfaces (e.g. heat sinks). Comply with the time required for the drive components to cool down (at least 15 minutes).</p>                                                                                                                                                                                                                                                                                                                          | <p><b>▲ ATTENTION</b> Surfaces chaudes (&gt; 60 °C)! Risque de brûlure !</p> <p>Évitez de toucher des surfaces métalliques (p. ex. dissipateurs thermiques). Respectez le délai de refroidissement des composants d'entraînement (au moins 15 minutes).</p>                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>▲ VORSICHT</b> Unsachgemäße Handhabung bei Transport und Montage! Verletzungsgefahr!</p> <p>Verwenden Sie geeignete Montage- und Transporteinrichtungen.</p> <p>Benutzen Sie geeignetes Werkzeug und persönliche Schutzausrüstung.</p>                                                                                                                                                                                                                                                                                                                                                                      | <p><b>▲ CAUTION</b> Improper handling during transport and mounting! Risk of injury!</p> <p>Use suitable equipment for mounting and transport.</p> <p>Use suitable tools and personal protective equipment.</p>                                                                                                                                                                                                                                                                                                                                         | <p><b>▲ ATTENTION</b> Manipulation incorrecte lors du transport et du montage ! Risque de blessure !</p> <p>Utilisez des dispositifs de montage et de transport adéquats.</p> <p>Utilisez des outils appropriés et votre équipement de protection personnel.</p>                                                                                                                                                                                                                                                                                                                                                                                         |

| Deutsch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Français                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <b>⚠ VORSICHT</b> Unsachgemäße Handhabung von Batterien! Verletzungsgefahr!<br>Versuchen Sie nicht, leere Batterien zu reaktivieren oder aufzuladen (Explosions- und Verätzungsgefahr).<br>Zerlegen oder beschädigen Sie keine Batterien. Werfen Sie Batterien nicht ins Feuer.                                                                                                                                                                                                                                                                                                                                                       | <b>⚠ CAUTION</b> Improper handling of batteries! Risk of injury!<br>Do not attempt to reactivate or recharge low batteries (risk of explosion and chemical burns).<br>Do not dismantle or damage batteries. Do not throw batteries into open flames.                                                                                                                                                                                                                                                                                                                                        | <b>⚠ ATTENTION</b> Manipulation incorrecte de piles! Risque de blessure!<br>N'essayez pas de réactiver des piles vides ou de les charger (risque d'explosion et de brûlure par acide).<br>Ne désassemblez et n'endommagez pas les piles. Ne jetez pas des piles dans le feu.                                                                                                                                                                                                                                                                                                                                         |
| Español                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Português                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Italiano                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>⚠ ADVERTENCIA</b> ¡Peligro de muerte en caso de no observar las siguientes indicaciones de seguridad!<br>Los productos no se pueden poner en servicio hasta después de haber leído por completo, comprendido y tenido en cuenta la documentación y las advertencias de seguridad que se incluyen en la entrega.<br>Si no dispusiera de documentación en el idioma de su país, diríjase a su distribuidor competente de Rexroth.<br>Solo el personal debidamente cualificado puede trabajar en componentes de accionamiento.<br>Encontrará más detalles sobre las indicaciones de seguridad en el capítulo 1 de esta documentación. | <b>⚠ ATENÇÃO</b> Perigo de vida em caso de inobservância das seguintes instruções de segurança!<br>Utilize apenas os produtos depois de ter lido, compreendido e tomado em consideração a documentação e as instruções de segurança fornecidas juntamente com o produto.<br>Se não tiver disponível a documentação na sua língua, dirija-se ao seu parceiro de venda responsável da Rexroth.<br>Apenas pessoal qualificado pode trabalhar nos componentes de acionamento.<br>Explicações mais detalhadas relativamente às instruções de segurança constam no capítulo 1 desta documentação. | <b>⚠ AVVERTENZA</b> Pericolo di morte in caso di inosservanza delle seguenti indicazioni di sicurezza!<br>Mettere in funzione i prodotti solo dopo aver letto, compreso e osservato per intero la documentazione e le indicazioni di sicurezza fornite con il prodotto.<br>Se non dovesse essere presente la documentazione nella vostra lingua, siete pregati di rivolgervi al rivenditore Rexroth competente.<br>Solo personale qualificato può eseguire lavori sui componenti di comando.<br>Per ulteriori spiegazioni riguardanti le indicazioni di sicurezza consultare il capitolo 1 di questa documentazione. |
| <b>⚠ ADVERTENCIA</b> ¡Alta tensión eléctrica! ¡Peligro de muerte por descarga eléctrica!<br>Active sólo los componentes de accionamiento con el conductor protector firmemente instalado.<br>Desconecte la alimentación eléctrica antes de manipular los componentes de accionamiento.<br>Tenga en cuenta los tiempos de descarga de los condensadores.                                                                                                                                                                                                                                                                               | <b>⚠ ATENÇÃO</b> Alta tensão elétrica! Perigo de vida devido a choque elétrico!<br>Opere componentes de acionamento apenas com condutores de proteção instalados.<br>Desligue a alimentação de tensão antes de aceder aos componentes de acionamento.<br>Respeite os períodos de descarga dos condensadores.                                                                                                                                                                                                                                                                                | <b>⚠ AVVERTENZA</b> Alta tensione elettrica! Pericolo di morte in seguito a scosse elettriche!<br>Mettere in esercizio i componenti di comando solo con conduttore di messa a terra ben installato.<br>Staccare l'alimentazione prima di intervenire sui componenti di comando.<br>Osservare i tempi di scarica del condensatore.                                                                                                                                                                                                                                                                                    |
| <b>⚠ ADVERTENCIA</b> ¡Movimientos peligrosos! ¡Peligro de muerte!<br>No permanezca en la zona de movimiento de las máquinas ni de sus piezas.<br>Impida el acceso accidental de personas.<br>Antes de acceder o introducir las manos en la zona de peligro, los accionamientos se tienen que haber parado con seguridad.                                                                                                                                                                                                                                                                                                              | <b>⚠ ATENÇÃO</b> Movimentos perigosos! Perigo de vida!<br>Não permaneça na área de movimentação das máquinas e das peças das máquinas.<br>Evite o acesso involuntário para pessoas.<br>Antes de entrar ou aceder à área perigosa, imobilize os acionamentos de forma segura.                                                                                                                                                                                                                                                                                                                | <b>⚠ AVVERTENZA</b> Movimenti pericolosi! Pericolo di morte!<br>Non sostare nelle zone di manovra delle macchine e delle loro parti.<br>Impedire un accesso non autorizzato per le persone.<br>Prima di accedere alla zona di pericolo, arrestare e bloccare gli azionamenti.                                                                                                                                                                                                                                                                                                                                        |
| <b>⚠ ADVERTENCIA</b> ¡Campos electromagnéticos/magnéticos! ¡Peligro para la salud de las personas con marcapasos, implantes metálicos o audífonos!<br>El acceso de las personas arriba mencionadas a las zonas de montaje o funcionamiento de los componentes de accionamiento está prohibido, salvo que lo autorice previamente un médico.<br><b>⚠ ATENCIÓN</b> ¡Superficies calientes (> 60 °C)! ¡Peligro de quemaduras!<br>Evite el contacto con las superficies calientes (p. ej., disipadores de calor). Observe el tiempo de enfriamiento de los componentes de accionamiento (mín. 15 minutos).                                | <b>⚠ ATENÇÃO</b> Campos eletromagnéticos / magnéticos! Perigo de saúde para pessoas com marcapassos, implantes metálicos ou aparelhos auditivos!<br>Acesso às áreas, nas quais os componentes de acionamento são montados e operados, é proibido para as pessoas em cima mencionadas ou apenas após permissão de um médico.<br><b>⚠ CUIDADO</b> Superfícies quentes (> 60 °C)! Perigo de queimaduras!<br>Evite tocar superfícies metálicas (p. ex. radiadores). Respeite o tempo de arrefecimento dos componentes de acionamento (mín. 15 minutos).                                         | <b>⚠ AVVERTENZA</b> Campi elettromagnetici / magnetici! Pericolo per la salute delle persone portatrici di pacemaker, protesi metalliche o apparecchi acustici!<br>L'accesso alle zone in cui sono installati o in funzione componenti di comando è vietato per le persone sopra citate o consentito solo dopo un colloquio con il medico.<br><b>⚠ ATTENZIONE</b> Superfici bollenti (> 60 °C)! Pericolo di ustioni!<br>Evitare il contatto con superfici metalliche (ad es. dissipatori di calore). Rispettare i tempi di raffreddamento dei componenti di comando (almeno 15 minuti).                              |

| Español                                                                                                                                                                                                                                                                                                                                                                                                                   | Português                                                                                                                                                                                                                                                                                                                                                                                                                                    | Italiano                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <b>⚠ ATENCIÓN</b> ¡Manipulación inadecuada en el transporte y montaje! ¡Peligro de lesiones!                                                                                                                                                                                                                                                                                                                              | <b>⚠ CUIDADO</b> Manejo incorreto no transporte e montagem! Perigo de ferimentos!                                                                                                                                                                                                                                                                                                                                                            | <b>⚠ ATTENZIONE</b> Manipolazione inappropriata durante il trasporto e il montaggio! Pericolo di lesioni!                                                                                                                                                                                                                                                                                                                                                                                           |
| Utilice dispositivos de montaje y de transporte adecuados.<br>Utilice herramientas adecuadas y equipo de protección personal.                                                                                                                                                                                                                                                                                             | Utilize dispositivos de montagem e de transporte adequados.<br>Utilize ferramentas e equipamento de proteção individual adequados.                                                                                                                                                                                                                                                                                                           | Utilizzare dispositivi di montaggio e trasporto adatti.<br>Utilizzare attrezzi adatti ed equipaggiamento di protezione personale.                                                                                                                                                                                                                                                                                                                                                                   |
| <b>⚠ ATENCIÓN</b> ¡Manejo inadecuado de las pilas! ¡Peligro de lesiones!                                                                                                                                                                                                                                                                                                                                                  | <b>⚠ CUIDADO</b> Manejo incorreto de baterias! Perigo de ferimentos!                                                                                                                                                                                                                                                                                                                                                                         | <b>⚠ ATTENZIONE</b> Utilizzo inappropriato delle batterie! Pericolo di lesioni!                                                                                                                                                                                                                                                                                                                                                                                                                     |
| No trate de reactivar o cargar pilas descargadas (peligro de explosión y cauterización).<br>No desarme ni dañe las pilas. No tire las pilas al fuego.                                                                                                                                                                                                                                                                     | Não tente reativar nem carregar baterias vazias (perigo de explosão e de queimaduras com ácido).<br>Não desmonte nem danifique as baterias. Não deite as baterias no fogo.                                                                                                                                                                                                                                                                   | Non tentare di riattivare o ricaricare batterie scariche (pericolo di esplosione e corrosione).<br>Non scomporre o danneggiare le batterie. Non gettare le batterie nel fuoco.                                                                                                                                                                                                                                                                                                                      |
| Svenska                                                                                                                                                                                                                                                                                                                                                                                                                   | Dansk                                                                                                                                                                                                                                                                                                                                                                                                                                        | Nederlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>⚠ WARNING</b> Livsfara om följande säkerhetsanvisningar inte följs!                                                                                                                                                                                                                                                                                                                                                    | <b>⚠ ADVARSEL</b> Livsfare ved manglende overholdelse af nedenstående sikkerhedsanvisninger!                                                                                                                                                                                                                                                                                                                                                 | <b>⚠ WAARSCHUWING</b> Levensgevaar bij niet-naleving van onderstaande veiligheidsinstructies!                                                                                                                                                                                                                                                                                                                                                                                                       |
| Använd inte produkterna innan du har läst och förstått den dokumentation och de säkerhetsanvisningar som medföljer produkten, och följ alla anvisningar.<br><br>Kontakta din Rexroth-återförsäljare om dokumentationen inte medföljer på ditt språk.<br><br>Endast kvalificerad personal får arbeta med drivkomponenterna.<br><br>Se kapitel 1 i denna dokumentation för närmare beskrivningar av säkerhetsanvisningarna. | Tag ikke produktet i brug, før du har læst og forstået den dokumentation og de sikkerhedsanvisninger, som følger med produktet, og overhold de givne anvisninger.<br><br>Kontakt din Rexroth-forhandler, hvis dokumentationen ikke medfølger på dit sprog.<br><br>Det er kun kvalificeret personale, der må arbejde på drive components.<br><br>Nærmere forklaringer til sikkerhedsanvisningerne fremgår af kapitel 1 i denne dokumentation. | Stel de producten pas in bedrijf nadat u de met het product geleverde documenten en de veiligheidsinformatie volledig gelezen, begrepen en in acht genomen heeft.<br><br>Mocht u niet beschikken over documenten in uw landstaal, kunt u contact opnemen met uw plaatselijke Rexroth distributiepartner.<br><br>Uitsluitend gekwalificeerd personeel mag aan de aandrijvingscomponenten werken.<br><br>Meer informatie over de veiligheidsinstructies vindt u in hoofdstuk 1 van deze documentatie. |
| <b>⚠ WARNING</b> Hög elektrisk spänning! Livsfara genom elchock!                                                                                                                                                                                                                                                                                                                                                          | <b>⚠ ADVARSEL</b> Elektrisk højspænding! Livsfare på grund af elektrisk stød!                                                                                                                                                                                                                                                                                                                                                                | <b>⚠ WAARSCHUWING</b> Hoge elektrische spanning! Levensgevaar door elektrische schok!                                                                                                                                                                                                                                                                                                                                                                                                               |
| Använd endast drivkomponenterna med fastmonterad skyddsledare.<br><br>Koppla bort spänningsförsörjningen före arbete på drivkomponenter.<br><br>Var medveten om kondensatorernas urladdningstid.                                                                                                                                                                                                                          | Drive components må kun benyttes med et fast installeret jordstik.<br><br>Sørg for at koble spændingsforsyningen fra, inden du rører ved drive components.<br><br>Overhold kondensatorernes afladningstider.                                                                                                                                                                                                                                 | Bedien de aandrijvingscomponenten uitsluitend met vast geïnstalleerde aardleiding.<br><br>Schakel voor toegang tot aandrijvingscomponenten de spanningsvoorziening uit.<br><br>Neem de ontladtid van condensatoren in acht.                                                                                                                                                                                                                                                                         |
| <b>⚠ WARNING</b> Farliga rörelser! Livsfara!                                                                                                                                                                                                                                                                                                                                                                              | <b>⚠ ADVARSEL</b> Farlige bevægelser! Livsfare!                                                                                                                                                                                                                                                                                                                                                                                              | <b>⚠ WAARSCHUWING</b> Risicovolle bewegingen! Levensgevaar!                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Uppehåll dig inte inom maskiners och maskinde-lars rörelseområde.<br><br>Förhindra att obehöriga personer får tillträde.<br><br>Innan du börjar arbeta eller vistas inom drivsystemets riskområde måste maskinen vara stillastående.                                                                                                                                                                                      | Du må ikke opholde dig inden for maskiners og maskindeles bevægelsesradius.<br><br>Sørg for, at ingen personer kan få utilsigtet adgang.<br><br>Standt drevene helt, inden du rører ved drevene eller træder ind i deres fareområde.                                                                                                                                                                                                         | Houdt u niet op in het bewegingsbereik van machines en machineonderdelen.<br><br>Voorkom dat personen onbedoeld toegang verkrijgen.<br><br>Voor toegang tot de gevaarlijke zone moeten de aandrijvingen veilig tot stilstand gebracht zijn.                                                                                                                                                                                                                                                         |
| <b>⚠ WARNING</b> Elektromagnetiska/magnetiska fält! Hälsofara för personer med pacemaker, implantat av metall eller hörapparat!                                                                                                                                                                                                                                                                                           | <b>⚠ ADVARSEL</b> Elektromagnetiske/magnetiske felter! Sundhedsfare for personer med pacemakere, metaliske implantater eller høreapparater!                                                                                                                                                                                                                                                                                                  | <b>⚠ WAARSCHUWING</b> Elektromagnetische / magnetische velden! Gevaar voor de gezondheid van personen met pacemakers, metalen implantaten of hoorapparaten!                                                                                                                                                                                                                                                                                                                                         |
| Det är förbjudet för ovan nämnda personer (eller kräver överläggning med läkare) att beträda områden där drivkomponenter är monterade och i drift.                                                                                                                                                                                                                                                                        | For disse personer er der adgang forbudt eller kun adgang med tilladelse fra læge til de områder, hvor drive components monteres og drives.                                                                                                                                                                                                                                                                                                  | Toegang tot gebieden, waarin aandrijvingscomponenten worden gemonteerd en bediend, is verboden voor voornoemde personen of uitsluitend toegestaan na overleg met een arts.                                                                                                                                                                                                                                                                                                                          |

| Svenska                                                                                                                                                                                                                                    | Dansk                                                                                                                                                                                                                                                          | Nederlands                                                                                                                                                                                                                                                                                       |
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| <b>▲ OBSERVERA</b> Varma ytor (> 60 °C)! Risk för brännskador!<br>Undvik att vidröra metallytor (t.ex. kylelement). Var medveten om att det tar tid för drivkomponenterna att svalna (minst 15 minuter).                                   | <b>▲ FORSIGTIG</b> Varme overflader (> 60 °C)! Risiko for forbrændinger!<br>Undgå at berøre metaloverflader (f.eks. køleelementer). Overhold drive components nedkølingstid (min. 15 min.).                                                                    | <b>▲ VOORZICHTIG</b> Hete oppervlakken (> 60 °C)! Verbrandingsgevaar!<br>Voorkom contact met metalen oppervlakken (bijv. Koellichamen). Afkoeitijd van de aandrijvingscomponenten in acht nemen (min. 15 minuten).                                                                               |
| <b>▲ OBSERVERA</b> Felaktig hantering vid transport och montering! Skaderisk!<br>Använd passande monterings- och transportanordningar.<br>Använd lämpliga verktyg och personlig skyddsutrustning.                                          | <b>▲ FORSIGTIG</b> Fejlhåndtering ved transport og montering! Risiko for kvæstelser!<br>Benyt egnede monterings- og transportanordninger.<br>Benyt egnet værktøj og personligt sikkerhedsudstyr.                                                               | <b>▲ VOORZICHTIG</b> Onjuist gebruik bij transport en montage! Letselgevaar!<br>Gebruik geschikte montage- en transportinrichtingen.<br>Gebruik geschikt gereedschap en een persoonlijke veiligheidsuitrusting.                                                                                  |
| <b>▲ OBSERVERA</b> Felaktig hantering av batterier! Skaderisk!<br>Försök inte återaktivera eller ladda upp batterier (risk för explosioner och frätskador).<br>Batterierna får inte tas isär eller skadas. Släng inte batterierna i elden. | <b>▲ FORSIGTIG</b> Fejlhåndtering af batterier! Risiko for kvæstelser!<br>Forsøg ikke at genaktivere eller oplade tomme batterier (eksplosions- og ætsningsfare).<br>Undlad at skille batterier ad eller at beskadige dem. Smid ikke batterier ind i åben ild. | <b>▲ VOORZICHTIG</b> Onjuist gebruik van batterijen! Letselgevaar!<br>Probeer nooit lege batterijen te reactiveren of op te laden (explosiegevaar en gevaar voor beschadiging van weefsel door cauterisatie).<br>Batterijen niet demonteren of beschadigen. Nooit batterijen in het vuur werpen. |

| Suomi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Polski                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Český                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <b>▲VAROITUS</b> Näiden turvaohjeiden noudattamatta jättämisestä on seurauksena hengenvaara!<br>Ota tuote käyttöön vasta sen jälkeen, kun olet lukenut läpi tuotteen mukana toimitetut asiakirjat ja turvallisuuohjeet, ymmärtänyt ne ja otanut ne huomioon.<br>Jos asiakirjoja ei ole saatavana omalla äidinkiellällä, ota yhteys asianomaiseen Rexrothin myyntiedustajaan.<br>Käyttölaitteiden komponenttien parissa saa työskennellä ainoastaan valtuutettu henkilöstö.<br>Lisätietoa turvaohjeista löydät tämän dokumentaation luvusta 1. | <b>▲OSTRZEŻENIE</b> Zagrożenie życia w razie nieprzestrzegania poniższych wskazań bezpieczeństwa!<br>Nie uruchamiać produktów przed uprzednim przeczytaniem i pełnym zrozumieniem wszystkich dokumentów dostarczonych wraz z produktem oraz wskazań bezpieczeństwa. Należy przestrzegać wszystkich zawartych tam zaleceń.<br>W przypadku braku dokumentów w Państwa języku, prosimy o skontaktowanie się z lokalnym partnerem handlowym Rexroth.<br>Przy zespołach napędowych może pracować wyłącznie wykwalifikowany personel.<br>Blizsze objaśnienia wskazań bezpieczeństwa znajdują się w Rozdziale 1 niniejszej dokumentacji. | <b>▲VAROVÁNÍ</b> Nebezpečí života v případě nedodržení níže uvedených bezpečnostních pokynů!<br>Před uvedením výrobků do provozu si přečtěte kompletní dokumentaci a bezpečnostní pokyny dodávané s výrobkem, pochopte je a dodržujte.<br>Nemáte-li k dispozici podklady ve svém jazyce, obraťte se na příslušného obchodního partnera Rexroth.<br>Na komponentách pohonu smí pracovat pouze kvalifikovaný personál.<br>Podrobnější vysvětlení k bezpečnostním pokynům naleznete v kapitole 1 této dokumentace. |
| <b>▲VAROITUS</b> Voimakas sähköjännite! Sähköiskun aiheuttama hengenvaara!<br>Käytä käyttölaitteen komponentteja ainoastaan maadoitusjohtimen ollessa kiinteästi asennettuna.<br>Katkaise jännitteensyöttö ennen käyttölaitteen komponenteille suoritettavien töiden aloittamista.<br>Huomioi kondensaattoreiden purkaajat.                                                                                                                                                                                                                   | <b>▲OSTRZEŻENIE</b> Wysokie napięcie elektryczne! Zagrożenie życia w wyniku porażenia prądem!<br>Zespoły napędu mogą być eksploatowane wyłącznie z zainstalowanym na stałe przełącznikiem ochronnym.<br>Przed uzyskaniem dostępu do podzespołów napędu należy odłączyć zasilanie elektryczne.<br>Zwracać uwagę na czas rozładowania kondensatorów.                                                                                                                                                                                                                                                                                | <b>▲VAROVÁNÍ</b> Vysoké elektrické napětí! Nebezpečí života při zasažení elektrickým proudem!<br>Komponenty pohonu smí být v provozu pouze s pevně nainstalovaným ochranným vodičem.<br>Než začnete zasahovat do komponent pohonu, odpojte je od elektrického napájení.<br>Dodržujte vybijací časy kondenzátorů.                                                                                                                                                                                                |
| <b>▲VAROITUS</b> Vaarallisia liikkeitä! Hengenvaara!<br>Älä oleskele koneiden tai koneenosien liikealueella.<br>Pidä huolta siitä, ettei muita henkilöitä pääse alueelle vahingossa.<br>Pysäytä käyttölaitteet varmasti ennen vaara-alueelle koskemista tai menemistä.                                                                                                                                                                                                                                                                        | <b>▲OSTRZEŻENIE</b> Niebezpieczne ruchy! Zagrożenie życia!<br>Nie wolno przebywać w obszarze pracy maszyny i jej elementów.<br>Nie dopuszczać osób niepowołanych do obszaru pracy maszyny.<br>Przed dotknięciem urządzenia/maszyny lub zbliżeniem się do obszaru zagrożenia należy zgodnie z zasadami bezpieczeństwa wyłączyć napęd.                                                                                                                                                                                                                                                                                              | <b>▲VAROVÁNÍ</b> Nebezpečné pohyby! Nebezpečí života!<br>Nezdružujte se v dosahu pohybu strojů a jejich součástí.<br>Před zásahem nebo vstupem do nebezpečného prostoru bezpečně zastavte pohony.                                                                                                                                                                                                                                                                                                               |

| Suomi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Polski                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Český                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p><b>VAROITUS</b> Sähkömagneettisia/magneettisia kenttiä! Terveydellisten haittojen vaara henkilöille, joilla on sydämentahdistin, metallinen implantti tai kuulolaite!</p> <p>Yllä mainituilta henkilöiltä on pääsy kielletty alueille, joilla asennetaan tai käytetään käyttölaiteen komponentteja, tai heidän on ensin saatava tähän suostumus lääkäriltään.</p> <p><b>HUOMIO</b> Kuumia pintoja (&gt; 60 °C)! Palovammojen vaara!</p> <p>Vältä metallipintojen koskettamista (esim. jäähdytyslevyt). Noudata käyttölaiteen komponenttien jäähdytysaikoja (väh. 15 minuuttia).</p> <p><b>HUOMIO</b> Epäasianmukainen käsittely kuljetuksen ja asennuksen yhteydessä! Loukkaantumisvaara!</p> <p>Käytä soveltuvia asennus- ja kuljetuslaitteita.</p> <p>Käytä omia työkaluja ja henkilökohtaisia suojavausteita.</p> <p><b>HUOMIO</b> Paristojen epäasianmukainen käsittely! Loukkaantumisvaara!</p> <p>Älä yritä saada tyhjiä paristoja toimimaan tai ladata niitä uudelleen (räjähdys- ja syöpymisvaara).</p> <p>Älä hajota paristoja osiin tai vaurioita niitä. Älä heitä paristoja tulleen.</p> | <p><b>OSTRZEŻENIE</b> Pola elektromagnetyczne / magnetyczne! Zagrożenie zdrowia dla osób z rozrusznikiem serca, metalowymi implantami lub aparatami słuchowymi!</p> <p>Wstęp na teren, gdzie odbywa się montaż i eksploatacja napędów jest dla ww. osób zabroniony względnie dozwolony po konsultacji z lekarzem.</p> <p><b>PRZESTROGA</b> Gorące powierzchnie (&gt; 60 °C)! Niebezpieczeństwo poparzenia!</p> <p>Unikać kontaktu z powierzchniami metalowymi (np. radiatorami). Przestrzegać czasów schładzania podzespołów napędów (min. 15 minut).</p> <p><b>PRZESTROGA</b> Niewłaściwe obchodzenie się podczas transportu i montażu! Ryzyko urazu!</p> <p>Stosować odpowiednie urządzenia montażowe i transportowe.</p> <p>Stosować odpowiednie narzędzia i środki ochrony osobistej.</p> <p><b>PRZESTROGA</b> Niewłaściwe obchodzenie się z bateriami! Ryzyko urazu!</p> <p>Nie próbować reaktywować i nie ładować zużytych baterii (niebezpieczeństwo wybuchu oraz poparzenia żrącą substancją).</p> <p>Nie demontować i nie czyszczyć baterii. Nie wrzucać baterii do ognia.</p> | <p><b>VAROVÁNÍ</b> Elektromagnetická/magnetická pole! Nebezpečí pro zdraví osob s kardiostimulátory, kovovými implantáty nebo naslouchadly!</p> <p>Výše uvedené osoby mají zakázán přístup do prostorů, kde jsou montovány a používány komponenty pohonu, resp. ho mají povolen pouze po poradě s lékařem.</p> <p><b>UPOZORNĚNÍ</b> Horké povrchy (&gt; 60 °C)! Nebezpečí popálení!</p> <p>Nedotýkejte se kovových povrchů (např. chladicích těles). Dodržujte dobu ochlazení komponent pohonu (min. 15 minut).</p> <p><b>UPOZORNĚNÍ</b> Nesprávné zacházení při přepravě a montáži! Nebezpečí zranění!</p> <p>Používejte vhodná montážní a dopravní zařízení. Používejte vhodné nářadí a osobní ochranné vybavení.</p> <p><b>UPOZORNĚNÍ</b> Nesprávné zacházení s bateriemi! Nebezpečí zranění!</p> <p>Nepokoušejte se znovu aktivovat nebo dobít prázdné baterie (nebezpečí výbuchu a poleptání).</p> <p>Nerozebírejte ani nepoškozujte baterie. Neházejte baterie do ohně.</p>                   |
| Slovensko                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Slovenčina                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Română                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>OPOZORILO</b> Življenjska nevarnost pri neupoštevanju naslednjih napotkov za varnost!</p> <p>Izdelke začnite uporabljati šele, ko v celoti preberete, razumete in upošteвате izdelkom priloženo dokumentacijo in varnostne napotke.</p> <p>Če priložena dokumentacija ni na voljo v vašem maternem jeziku, se obrnite na pristojnega distributerja Rexroth.</p> <p>Samo kvalificirano osebje sme delati na pogonskih komponentah.</p> <p>Podrobnejša pojasnila o varnostnih navodilih najdete v poglavju 1 v tej dokumentaciji.</p> <p><b>OPOZORILO</b> Visoka električna napetost! Življenjska nevarnost zaradi električnega udara!</p> <p>Pogonske komponente uporabljajte samo s fiksno nameščenim zaščitnim vodnikom.</p> <p>Pred dostopom do pogonske komponente odklopite napajanje.</p> <p>Upošteвайте čase praznjenja kondenzatorjev.</p>                                                                                                                                                                                                                                                | <p><b>VAROVANIE</b> Nebezpečnost ohrozenia života pri nedodržavanju nasledujúcich bezpečnostných pokynov!</p> <p>Výrobky uvádzajte do prevádzky až potom, čo ste úplne prečítali, pochopili a zobrali do úvahy podklady a bezpečnostné pokyny dodané s výrobkom.</p> <p>Ak by ste nemali k dispozícii žiadne podklady v jazyku svojej krajiny, obráťte sa prosím na svojho príslušného predajcu Rexroth.</p> <p>Na komponentoch pohonu smie pracovať iba kvalifikovaný personál.</p> <p>Blíže vysvetlenia k bezpečnostným pokynom zistíte z kapitoly 1 tejto dokumentácie.</p> <p><b>VAROVANIE</b> Vysoké elektrické napätie! Nebezpečnost ohrozenia života v dôsledku zásahu elektrickým prúdom!</p> <p>Komponenty pohonu prevádzkujte iba s pevne nainštalovaným ochranným vodičom.</p> <p>Pred prístupom na komponenty pohonu odpojte zdroj napätia.</p> <p>Reșpektujte țasy vybitia condensatorov.</p>                                                                                                                                                                              | <p><b>AVERTIZARE</b> Pericol de moarte în cazul nerespectării următoarelor instrucțiuni de siguranță!</p> <p>Punerea în funcțiune a produselor trebuie efectuată după citirea, înțelegerea și respectarea documentelor și instrucțiunilor de siguranță, care sunt livrate împreună cu produsele.</p> <p>În cazul în care documentele nu sunt în limba dumneavoastră maternă, vă rugăm să contactați partenerul de vânzări Rexroth.</p> <p>Nu mai un personal calificat poate lucra cu componentele de acționare.</p> <p>Explicații detaliate privind instrucțiunile de siguranță găsiți în capitolul 1 al acestei documentații.</p> <p><b>AVERTIZARE</b> Tensiune electrică înaltă! Pericol de moarte prin electrocutare!</p> <p>Exploatați componentele de acționare numai cu împământarea instalată permanent.</p> <p>Înainte de intervenția asupra componentelor de acționare, deconectați alimentarea cu tensiune electrică.</p> <p>Țineți cont de timpii de descărcare ai condensatorilor.</p> |

| Slovensko                                                                                                                                                                                                                                                                                                                  | Slovenčina                                                                                                                                                                                                                                                                                                                                          | Română                                                                                                                                                                                                                                                                                                                                                            |
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| <p><b>▲ OPOZORILO</b> Nevarni premiki! Življenjska nevarnost!</p> <p>Ne zadržujte se v območju delovanja strojev. Preprečite nenadzorovan dostop oseb.</p> <p>Pred prijemom ali dostopom v nevarno območje varno zaustavite vse gnane dele.</p>                                                                            | <p><b>▲ VAROVANJE</b> Pohyby prinášajúce nebezpečenstvo! Nebezpečenstvo ohrozenia života!</p> <p>Nezdržiavajte sa v oblasti pohybu strojov a častí strojov.</p> <p>Zabráňte nepovolanému prístupu osôb.</p> <p>Pred zásahom alebo prístupom do nebezpečnej oblasti uveďte pohony bezpečne do zastavenia.</p>                                        | <p><b>▲ AVERTIZARE</b> Mișcări periculoase! Pericol de moarte!</p> <p>Nu staționați în zona de mișcare a mașinilor și a componentelor în mișcare a mașinilor.</p> <p>Împiedicați accesul intenționat al persoanelor în zona de lucru a mașinilor.</p> <p>Înainte de intervenția sau accesul în zona periculoasă, opriți în siguranță componentele de acțiune.</p> |
| <p><b>▲ OPOZORILO</b> Elektromagnetna / magnetna polja! Nevarnost za zdravje za osebe s spodbojevalniki srca, kovinskimi vsadki ali slušnimi aparati!</p> <p>Dostop do območij, v katerih so nameščene delujoče pogonske komponente, je za zgoraj navedene osebe prepovedan oz. dovoljen samo po posvetu z zdravnikom.</p> | <p><b>▲ VAROVANJE</b> Elektromagnetické / magnetické polia! Nebezpečenstvo pre zdravie osôb s kardiostimulátormi, kovovými implantátmi alebo načívacími prístrojmi!</p> <p>Prístup k oblastiam, v ktorých sú namontované a prevádzkujú sa komponenty pohonu, je pre hore uvedené osoby zakázaný resp. je dovolený iba po konzultácii s lekárom.</p> | <p><b>▲ AVERTIZARE</b> Câmpuri electromagnetice / magnetice! Pericol pentru sănătatea persoanelor cu stimulatoare cardiace, implanturi metalice sau aparate auditive!</p> <p>Întrarea în zone, în care se montează sau se exploatează componente de acționare, este interzisă pentru persoanele sus numite respectiv este permisă numai cu acordul medicului.</p> |
| <p><b>▲ POZOR</b> Vroče površine (&gt; 60 °C)! Nevarnost opeklin!</p> <p>Izogibajte se stiku s kovinskimi površinami (npr. hladilnimi tesli). Upošteвайте čas hladenja pogonskih komponent (najm. 15 minut).</p>                                                                                                           | <p><b>▲ UPOZORNENIE</b> Horúce povrchy (&gt; 60 °C)! Nebezpečenstvo popálenia!</p> <p>Zabráňte kontaktu s kovovými povrchmi (napr. chladiacimi telesami). Dodržiavajte čas vychladenia komponentov pohonu (min. 15 minút).</p>                                                                                                                      | <p><b>▲ ATENȚIE</b> Suprafețe fierbinți (&gt; 60 °C)! Pericol de arsuri!</p> <p>Nu atingeți suprafețele metalice (de ex. radiatoare de răcire). Respectați timpii de răcire ai componentelor de acționare (min. 15 minute).</p>                                                                                                                                   |
| <p><b>▲ POZOR</b> Nestrokovno ravnanje med transportom in namestitvi! Nevarnost poškodb!</p> <p>Uporablajte ustrezne pripomočke za nameščanje in transport.</p> <p>Uporabite ustrezno orodje in osebno zaščitno opremo.</p>                                                                                                | <p><b>▲ UPOZORNENIE</b> Neodborná manipulácia pri transporte a montáži! Nebezpečenstvo poranenia!</p> <p>Používajte vhodné montážne a transportné zariadenia.</p> <p>Používajte vhodné náradie a osobné ochranné prostriedky.</p>                                                                                                                   | <p><b>▲ ATENȚIE</b> Manipulare necorespunzătoare la transport și montaj! Pericol de vătămare!</p> <p>Utilizați dispozitive adecvate de montaj și transport.</p> <p>Folosiți instrumente corespunzătoare și echipament personal de protecție.</p>                                                                                                                  |
| <p><b>▲ POZOR</b> Nepravilno ravnanje z baterijami! Nevarnost poškodb!</p> <p>Ne poskušajte ponovno aktivirati ali napolniti praznih baterij (Nevarnost zaradi eksplozij ali jedkanja).</p> <p>Ne razstavljajte ali poškodujte nobenih baterij. Baterij ne mečite v ogenj.</p>                                             | <p><b>▲ UPOZORNENIE</b> Neodborná manipulácia s batériami! Nebezpečenstvo poranenia!</p> <p>Nepokúšajte sa reaktivovať alebo nabíjať prázdne batérie (nebezpečenstvo výbuchu a poleptania).</p> <p>Batérie nerozoberajte ani nepoškodujte. Nehádzte batérie do ohňa.</p>                                                                            | <p><b>▲ ATENȚIE</b> Manipulare necorespunzătoare a bateriilor! Pericol de vătămare!</p> <p>Nu încercați să reactivați sau să încărcați bateriile goale (pericol de explozie și pericol de arsuri).</p> <p>Nu dezasamblați și nu deteriorați bateriile. Nu aruncați bateriile în foc.</p>                                                                          |

| Magyar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Български                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Latviski                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p><b>▲ FIGYELMEZTETÉS!</b> Az alábbi biztonságí útmutatók figyelmen kívül hagyása életveszélyes helyezteth vezethet!</p> <p>Üzembe helyezés előtt olvassa el, értelmezze, és vegye figyelembe a csomagban található dokumentumban foglaltakat és a biztonságí útmutatókat.</p> <p>Amennyiben a csomagban nem talál az Ön nyelvén írt dokumentumokat, vegye fel a kapcsolatot az illetékes Rexroth-képviselővel.</p> <p>A hajtás alkatrészein kizárólag képzett személy dolgozzhat.</p> <p>A biztonságí útmutatókkal kapcsolatban további magyarázatot ennek a dokumentumnak az első fejezetében találhat.</p> | <p><b>▲ ПРЕДУПРЕЖДЕНИЕ</b> Опасност за живота при неспазване на посочените по-долу инструкции за безопасност!</p> <p>Използвайте продуктите след като сте се запознали подробно с приложената към продукта документация и указания за безопасност, разбрали сте ги и сте се съобразили с тях.</p> <p>Ако текстът не е написан на Вашия език, моля обърнете се към Вашия компетентен търговски представител на Rexroth.</p> <p>Със задвижващите компоненти трябва да работи само квалифициран персонал.</p> <p>Подобри пояснения към инструкциите за безопасност можете да видите в Глава 1 на тази документация.</p> | <p><b>▲ BRĪDĪNĀJUMS</b> Turpinājumā doto drošības norādījumu neievērošana var apdraudēt dzīvību!</p> <p>Sāciet lietot izstrādājumu tikai pēc tam, kad esat pilnībā izlasījuši, sapraūši un ņēmuši vērā kopā ar izstrādājumu piegādātos dokumentus.</p> <p>Ja dokumenti nav pieejami Jūsu valsts valodā, vērsieties pie pilnvarotā Rexroth izplatītāja.</p> <p>Darbus pie piedziņas komponentiem drīkst veikt tikai kvalificēts personāls.</p> <p>Detalizētus paskaidrojumus attiecībā uz drošības norādījumiem skatiet šī dokumenta 1. nodaļā.</p> |

| Magyar                                                                                                                                                                                                                                                                                                                                                                                                  | Български                                                                                                                                                                                                                                                                                                                                                        | Latviski                                                                                                                                                                                                                                                                                                                                                  |
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| <p><b>▲ FIGYELMEZTETÉS!</b> Magas elektromos feszültség! Életveszély áramütés miatt!</p> <p>A hajtás alkatrészeit csak véglegesen telepített védővezetővel üzemeltess!</p> <p>Mielőtt hozzányúl a hajtás alkatrészeihez, kapcsolja ki az áramellátást.</p> <p>Ügyeljen a kondenzátorok kisülési idejére!</p>                                                                                            | <p><b>▲ ПРЕДУПРЕЖДЕНИЕ</b> Високо електрическо напрежение! Опасност за живота от удар от електрически ток!</p> <p>Работете със задвижващите компоненти само при здраво закрепен заземяващ проводник.</p> <p>Преди работа по задвижващите компоненти, изключете захранващото напрежение.</p> <p>Обърнете внимание на времето за разреждане на кондензаторите.</p> | <p><b>▲ BRĪDINĀJUMS</b> Augsts elektriskais spriegums! Dzīvības apdraudējums elektriskā trieciena dēļ!</p> <p>Piedziņas komponentus darbiniet tikai ar fiksēti uzstādītu zemejvadu.</p> <p>Pirms darba pie piedziņas komponentiem atslēdziet elektroapgādi.</p> <p>Nemiet vērā kondensatoru izlādes laikus.</p>                                           |
| <p><b>▲ FIGYELMEZTETÉS!</b> Veszélyes mozgás! Életveszély!</p> <p>Ne tartózkodjon a gépek és a gépalkatrészek mozgási területén belül!</p> <p>Illetékelen személyeket ne engedjen a gép közelébe!</p> <p>Mielőtt beavatkozik, vagy a veszélyes zónába lép a hajtásokat biztonságosan állítsa le.</p>                                                                                                    | <p><b>▲ ПРЕДУПРЕЖДЕНИЕ</b> Опасни движения! Опасност за живота!</p> <p>Не стойте в обсега на движение на машините и частите на машините.</p> <p>Не допускайте непреднамерен достъп на хора.</p> <p>Преди работа или влизане в опасната зона, спрете надеждно приводния механизъм.</p>                                                                            | <p><b>▲ BRĪDINĀJUMS</b> Bīstamas kustības! Dzīvības apdraudējums!</p> <p>Neuzturieties mašīnu un mašīnas detaļu kustību zonā.</p> <p>Novērsiet nepiederošu personu piekļūšanu.</p> <p>Pirms darba bīstamajā zonā pilnībā apstādiniet piedziņu.</p>                                                                                                        |
| <p><b>▲ FIGYELMEZTETÉS!</b> Elektromágneses / mágneses mező! Káros hatással lehet a szívritmus-szabályozó készülékkel, fémbeültetéssel vagy hallókészülékkel rendelkezők egészségére!</p> <p>Azokra a területekre, ahol hajtások alkatrészeit szerelik és üzemeltetik, a fent említett személyeknek tilos a belépés, illetve csak orvosi konzultációt követően szabad az adott területekre lépniük.</p> | <p><b>▲ ПРЕДУПРЕЖДЕНИЕ</b> Електромагнитни / магнитни полета! Опасност за здравето на хора със сърдечни стимулатори, метални импланти или слухови апарати!</p> <p>Достъпът за гореспоменатите лица до зони, в които ще се монтират и ще работят задвижващи компоненти се забранява, или разрешава само след консултация с лекар.</p>                             | <p><b>▲ BRĪDINĀJUMS</b> Elektromagnētiskais / magnētiskais lauks! Veselības apdraudējums personām ar sirds stimulatoriem, metāliskiem implantiem vai dzirdes aparātiem!</p> <p>Tuvošanās zonām, kurās tiek montēti un darbināti piedziņas komponenti, iepriekš minētajām personām ir aizliegta, respektīvi, atļauta tikai pēc konsultēšanās ar ārstu.</p> |
| <p><b>▲ VIGYÁZATI</b> Forró felületek (&gt; 60 °C)! Égésveszély!</p> <p>Ne érjen hozzá fémfelületekhez (pl. hűtőtestekhez)! Vegye figyelembe a hajtás alkatrészeinek kihűlési idejét (min. 15 perc)!</p>                                                                                                                                                                                                | <p><b>▲ ВНИМАНИЕ</b> Горещи повърхности (&gt; 60 °C)! Опасност от изгаряне!</p> <p>Не докосвайте метални повърхности (например радиатори). Сълюдавайте времето на охлаждане на задвижващите компоненти (мин. 15 минути).</p>                                                                                                                                     | <p><b>▲ UZMANĪBU</b> Karstas virsmas (&gt; 60 °C)! Apdedzināšanās risks!</p> <p>Neskarieties pie metāliskām virsmām (piemēram, dzesētāja). Ļaujiet piedziņas komponentiem atdzist (min. 15 minūtes).</p>                                                                                                                                                  |
| <p><b>▲ VIGYÁZATI</b> Szakszerűtlen kezelés szállításkor és szereléskor! Sérülésveszély!</p> <p>A megfelelő beszerelési és szállítási eljárásokat alkalmazza!</p> <p>Használjon megfelelő szerszámokat és személyes védőfelszerelést!</p>                                                                                                                                                               | <p><b>▲ ВНИМАНИЕ</b> Неправилно боравене по време на транспорт и монтаж! Опасност от нараняване!</p> <p>Използвайте подходящо монтажно и транспортно оборудване.</p> <p>Използвайте подходящи инструменти и лични предпазни средства.</p>                                                                                                                        | <p><b>▲ UZMANĪBU</b> Nepareizi veikta transportēšana un montāža! Traumu gūšanas risks!</p> <p>Izmantojiet piemērotas montāžas un transportēšanas ierīces.</p> <p>Izmantojiet piemērotus instrumentus un individuālos aizsardzības līdzekļus.</p>                                                                                                          |
| <p><b>▲ VIGYÁZATI</b> Akkumulátorok szakszerűtlen kezelése! Sérülésveszély!</p> <p>Üres akkumulátorokat ne aktiváljon újra, illetve ne töltsön fel (robbanás- és marásveszély)! Az akkumulátorokat ne szedje szét, és ne rongálja meg! Az akkumulátort ne dobja tűzbe!</p>                                                                                                                              | <p><b>▲ ВНИМАНИЕ</b> Неправилно боравене с батерии! Опасност от нараняване!</p> <p>Не се опитвайте да активирате отново или да зареждате разредени батерии (Опасност от експлозия и напръскване с агресивен агент).</p> <p>Не разгрявайте и не повреждайте батерии. Не хвърляйте батерии в огън.</p>                                                             | <p><b>▲ UZMANĪBU</b> Nepareiza bateriju lietošana! Traumu gūšanas risks!</p> <p>Nemēģiniet no jauna aktivizēt vai uzlādēt tukšas baterijas (eksploziju un ķīmisko apdegumu draudi).</p> <p>Neizjauciet un nesabojājat baterijas. Nemetiet baterijas uguni.</p>                                                                                            |

| Lietuviškai                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Eesti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Ελληνικά                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <p><b>▲ ĮSPĖJIMAS</b> Pavojus gyvybei nesilaikant toliau pateikiamų saugumo nurodymų!</p> <p>Naudokite gaminį tik kruopščiai perskaitę prie jo pridėtus aprašus, saugumo nurodymus. Susipažinkite su jais ir vadovaukitės naudodami gaminį.</p> <p>Jei jūs negavote aprašo gimtąja kalba, kreipkitės į įgaliotus Rexroth atstovus.</p> <p>Prie pavaros komponentų leidžiama dirbti tik kvalifikuotam personalui.</p> <p>Išsamesnius saugumo nurodymų paaiškinimus rasite šios dokumentacijos 1 skyriuje.</p> | <p><b>▲ HOIATUS</b> Alljärgnevate ohutusjuhiste eiramine on eluohtlik!</p> <p>Võtke tooted käiku alles siis, kui olete toodetega kaassolevad materjalid ning ohutusjuhised täielikult läbi lugenud, neist aru saanud ja neid järginud.</p> <p>Kui Teil puuduvad emakeelsed materjalid, siis pöörduge Rexrothi kohaliku müügiesinduse poole.</p> <p>Ajamikomponentidega tohib töötada üksnes kvalifitseeritud personal.</p> <p>Täpsemad selgitusi ohutusjuhiste kohta leiate käesoleva dokumentatsiooni peatükist 1.</p> | <p><b>▲ ΠΡΟΕΙΔΟΠΟΙΗΣΗ</b> Κίνδυνος θανάτου σε περίπτωση μη συμμόρφωσης με τις παρακάτω οδηγίες ασφαλείας!</p> <p>Θέστε το προϊόν σε λειτουργία αφού διαβάσετε, κατανοήσετε και λάβετε υπόψη το σύνολο των οδηγιών ασφαλείας που το συνοδεύουν.</p> <p>Εάν δεν υπάρχει τεκμηρίωση στη γλώσσα σας, απευθυνθείτε σε εξουσιοδοτημένο αντιπρόσωπο της Rexroth.</p> <p>Μόνο εξειδικευμένο προσωπικό επιτρέπεται να χειρίζεται στοιχεία μετάδοσης κίνησης.</p> <p>Περατέρω επεξηγήσεις των οδηγιών ασφαλείας διατίθενται στο κεφάλαιο 1 της παρούσας τεκμηρίωσης.</p> |
| <p><b>▲ ĮSPĖJIMAS</b> Aukšta elektros įtampa! Pavojus gyvybei dėl elektros smūgio!</p> <p>Pavaros komponentus eksploatuokite tik su fiksuotai instaliuotu apsauginiu laidu.</p> <p>Prieš priedami prie pavaros komponentų išjunkite maitinimo įtampą.</p> <p>Atsižvelkite į kondensatorių išsikrovimo trukmę.</p>                                                                                                                                                                                            | <p><b>▲ HOIATUS</b> Kõrge elektripinge! Eluohtlik elektrilöögi tõttu!</p> <p>Käitage ajamikomponente üksnes püsivalt installeeritud maandusega.</p> <p>Lülitage enne ajamikomponentidega tööde alustamist toitepinge välja.</p> <p>Järgige kondensaatorite mahalaadumisaegu.</p>                                                                                                                                                                                                                                        | <p><b>▲ ΠΡΟΕΙΔΟΠΟΙΗΣΗ</b> Υψηλή ηλεκτρική τάση! Κίνδυνος θανάτου από ηλεκτροπληξία!</p> <p>Θέτετε σε λειτουργία τα στοιχεία μετάδοσης κίνησης μόνο εφόσον έχει τοποθετηθεί καλά προστατευτικός αγωγός γείωσης.</p> <p>Πριν από οποιαδήποτε παρέμβαση, αποσυνδέστε την τροφοδοσία των στοιχείων μετάδοσης κίνησης.</p> <p>Λάβετε υπόψη τους χρόνους αποφόρτισης των πυκνωτών.</p>                                                                                                                                                                               |
| <p><b>▲ ĮSPĖJIMAS</b> Pavojingi judesiai! Pavojus gyvybei!</p> <p>Nebūkite mašinų ar jų dalių judėjimo zonoje.</p> <p>Neleiskite netyčia patekti asmenims.</p> <p>Prieš patekdami į pavojaus zoną saugiai išjunkite pavaras.</p>                                                                                                                                                                                                                                                                             | <p><b>▲ HOIATUS</b> Ohtlikud liikumised! Eluohtlik!</p> <p>Ärge viibige masina ja masinaosade liikumispirkonnas.</p> <p>Tõkestage inimeste ettekavatsematu sisenemine masina ja masinaosade liikumispirkonda.</p> <p>Tagage ajamite turvaline seiskamine enne ohupirkonda juurdepääsu või sisenemist.</p>                                                                                                                                                                                                               | <p><b>▲ ΠΡΟΕΙΔΟΠΟΙΗΣΗ</b> Εκκινδυνεύς τάσεις! Κίνδυνος θανάτου!</p> <p>Μην στέκεστε στην περιοχή κίνησης μηχανημάτων και εξαρτημάτων.</p> <p>Αποτρέψτε την τυχαία είσοδο ατόμων.</p> <p>Πριν από την παρέμβαση ή πρόσβαση στην περιοχή κινδύνου, μεριμνήστε για την ασφαλή ακινητοποίηση των συστημάτων μετάδοσης κίνησης.</p>                                                                                                                                                                                                                                 |
| <p><b>▲ ĮSPĖJIMAS</b> Elektromagnetiniai / magnetiniai laukai! Pavojus asmenų su širdies stimulatoriais, metaliniais implantais arba klausos aparatais sveikatai!</p> <p>Prieiga prie zonų, kuriose montuojami ir eksploatuojami pavaros komponentai, aukščiau nurodytiems asmenims yra draudžiama arba leistina tik pasitarus su gydytoju.</p>                                                                                                                                                              | <p><b>▲ HOIATUS</b> Elektromagnetilised / magnetilised väljad! Terviseohtlik südamestimulaatorite, metallimplantaatide ja kuulmiseadmetega inimestele!</p> <p>Sisenemine piirkondadesse, kus toimub ajamikomponentide monteerimine ja käitamine, on ülalnimetatud isikutele keelatud või lubatud üksnes pärast arstiga konsulteerimist.</p>                                                                                                                                                                             | <p><b>▲ ΠΡΟΕΙΔΟΠΟΙΗΣΗ</b> Ηλεκτρομαγνητικά/μαγνητικά πεδία! Κίνδυνος για την υγεία ατόμων με καρδιακούς βηματοδότες, μεταλλικά εμφυτεύματα ή συσκευές ακοής!</p> <p>Η είσοδος σε περιοχές όπου πραγματοποιείται συναρμολόγηση και λειτουργία στοιχείων μετάδοσης κίνησης απαγορεύεται στα προσαναφερθέντα άτομα, εκτός αν τους έχει δοθεί σχετική άδεια κατόπιν συνεννόησης με γιατρό.</p>                                                                                                                                                                     |
| <p><b>▲ NEREPĖJIMAS</b> Karšti paviršiai (&gt; 60 °C)! Nudėjimo pavojus!</p> <p>Venkite liesti metalinius paviršius (pvz., radiatorių). Išlaikykite pavaros komponentų atvėsimą trukmę (bent 15 minučių).</p>                                                                                                                                                                                                                                                                                                | <p><b>▲ ETTEVAATUST</b> Kuumad välispinnad (&gt; 60 °C)! Põletusohut!</p> <p>Vältige metalsete välispindade (nt radiaatorid) puudutamist. Pidage kinni ajamikomponentide mahajahutumisajast (vähemalt 15 minutit).</p>                                                                                                                                                                                                                                                                                                  | <p><b>▲ ΠΡΟΞΟΧΗ</b> Καυτές επιφάνειες (&gt; 60 °C)! Κίνδυνος εγκαύματος!</p> <p>Αποφύγετε την επαφή με μεταλλικές επιφάνειες (π.χ. μονάδες ψύξης). Λάβετε υπόψη το χρόνο ψύξης των στοιχείων μετάδοσης κίνησης (τουλάχιστον 15 λεπτά).</p>                                                                                                                                                                                                                                                                                                                     |
| <p><b>▲ PERSPĖJIMAS</b> Netinkamas darbas transportuojant ir montuojant! Susižalojimo pavojus!</p> <p>Naudokite tinkamus montavimo ir transportavimo įrenginius.</p> <p>Naudokite tinkamus įrankius ir asmens saugos priemones.</p>                                                                                                                                                                                                                                                                          | <p><b>▲ ETTEVAATUST</b> Asjatundmatu käsitemine transportimisel ja montaažil! Vigastusohut!</p> <p>Kasutage sobivaid montaaži- ja transportiseadiseid.</p> <p>Kasutage sobivaid tööriistu ja isiklikku kaitsevarustust.</p>                                                                                                                                                                                                                                                                                             | <p><b>▲ ΠΡΟΞΟΧΗ</b> Ακατάλληλος χειρισμός κατά τη μεταφορά και συναρμολόγηση! Κίνδυνος τραυματισμού!</p> <p>Χρησιμοποιείτε κατάλληλους μηχανισμούς συναρμολόγησης και μεταφοράς.</p> <p>Χρησιμοποιείτε κατάλληλα εργαλεία και ατομικό εξοπλισμό προστασίας.</p>                                                                                                                                                                                                                                                                                                |

| Lietuviškai                                                                            | Eesti                                                                                              | Ελληνικά                                                                                               |
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| <b>▲ PERSPĖJIMAS</b> Netinkamas darbas su baterijomis! Susižalojimo pavojus!           | <b>▲ ETTEVAATUSTI</b> Patareide asjatundmatu käsitlemine! Vigastusohk!                             | <b>▲ ΠΡΟΣΟΧΗ</b> Ακατάλληλος χειρισμός μπαταριών! Κίνδυνος τραυματισμού!                               |
| Nebandykite tuščių baterijų reaktyvuoti arba įkrauti (sprogimo ir išsėdinimo pavojus). | Ärge üritage kunagi tühje patareisid reakti-veerida või täis laadida (plahvatus- ja söõvitu-soht). | Μην επιδιώκετε να ενεργοποιήσετε ξανά ή να φορτίσετε κενές μπαταρίες (κίνδυνος έκρηξης και διάβρωσης). |
| Neardykite ir nepažeiskite baterijų. Nemeskite baterijų į ugnį.                        | Ärge demonteerige ega kahjustage patareisid. Ärge visake patareisid tulle.                         | Μην διαλύετε ή καταστρέφετε τις μπαταρίες. Μην απορρίπτετε τις μπαταρίες στη φωτιά.                    |

| 中文                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>▲警告 如果不按照下述指定的安全说明使用，将会导致人身伤害！</b><br>在没有阅读，理解随本产品附带的文件并熟知正当使用前，不要安装或使用本产品。<br>如果没有您所在国家官方语言文件说明，请与 Rexroth 销售伙伴联系。<br>只允许有资格人员对驱动器部件进行操作。<br>安全说明的详细解释在本文档的第一章。<br><b>▲警告 高压！电击导致生命危险！</b><br>只有在安装了永久良好的设备接地导线后才可以对驱动器的部件进行操作。<br>在接触驱动器部件前先将驱动器部件断电。<br>确保电容放电时间。<br><b>▲警告 危险运动！生命危险！</b><br>保证设备的运动区域内和移动部件周围无障碍物。<br>防止人员意外进入设备运动区域内。<br>在接近或进入危险区域之前，确保传动设备安全停止。<br><b>▲警告 电磁场/磁场！对佩戴心脏起搏器、金属植入物和助听器的人员会造成严重的人身伤害！</b><br>上述人员禁止进入安装及运行的驱动器区域，或者必须事先咨询医生。<br><b>▲小心 热表面（大于 60 度）！灼伤风险！</b><br>不要触摸金属表面（例如散热器）。驱动器部件断电后需要时间进行冷却（至少 15 分钟）。<br><b>▲小心 安装和运输不当导致受伤危险！当心受伤！</b><br>使用适当的运输和安装设备。<br>使用适合的工具及用适当的防护设备。<br><b>▲小心 电池操作不当！受伤风险！</b><br>请勿对低电量电池重新激活或重新充电（爆炸和腐蚀的危险）。<br>请勿拆解或损坏电池。请勿将电池投入明火中。 |

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# 1 About this documentation

## 1.1 Purpose and editions of this documentation

This instruction must be observed by assemblers, operators, service engineers and facility operators. It contains notes about handling a motor. Before operating motors, read this operating instruction to ensure a safe and smooth functionality and a long motor lifetime.

Table 1: Record of revisions

| Edition | Release date | Notes                                   |
|---------|--------------|-----------------------------------------|
| 01      | 11/2018      | First edition                           |
| 02      | 07/2020      | Amended frame size MS2E10               |
| 03      | 01/2022      | Revision, modified topic electrostatics |

## 1.2 Presentation of information

### Safety instructions

The safety instructions in this documentation include signal words (danger, warning, caution, note) and a signal symbol (acc. to ANSI Z535.6-2006).

The signal word is intended to draw your attention to the safety instructions and describes the seriousness of the danger. The warning triangle with exclamation mark indicates the danger for persons.

|                                                                                                      |
|------------------------------------------------------------------------------------------------------|
| <b>⚠ DANGER</b>                                                                                      |
| Non-compliance with this safety instructions <b>will</b> result in death or severe personal injury.  |
| <b>⚠ WARNING</b>                                                                                     |
| Non-compliance with this safety instructions <b>can</b> result in death or severe personal injury.   |
| <b>⚠ CAUTION</b>                                                                                     |
| Non-compliance with this safety instructions <b>can</b> result in moderate or minor personal injury. |
| <b>NOTICE</b>                                                                                        |
| Non-compliance with this safety instructions <b>can</b> result in material damage.                   |

### Safety symbols

In the documentation, the following internationally standardized safety signs and graphic symbols are used. The meaning of the symbols is described in the table.

Table 2: Meaning of safety signs

| Safety symbols                                                                      | Meaning                                                                                                                                      |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|    | Warning against dangerous electric voltage                                                                                                   |
|    | Warning against hot surfaces                                                                                                                 |
|    | Warning against rotating machine parts                                                                                                       |
|   | Warning against overhead load                                                                                                                |
|  | Electrostatic sensitive devices                                                                                                              |
|  | Prohibited for persons with active implantable medical devices (AIMD) or passive metallic implants (body aids) as well as for pregnant women |
|  | Do not carry along metal parts or clocks.                                                                                                    |
|  | Hammer scales are forbidden                                                                                                                  |

## Meaning of symbols

Table 3: Meaning of symbols

| Symbol                                                                            | Meaning                                                                                                                                       |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|  | Reference to supplementary documentation                                                                                                      |
|  | Explosion protection identification                                                                                                           |
|  | The UL Recognized Component Mark identifies recognized component parts which are components of a bigger product or system.                    |
|  | The letters "C" and "E" stand for "Conformité Européenne". The CE-marking expresses the conformity of a product with relevant EC-regulations. |
|  | Components for the use in systems for "integrated safety technique" prepared.                                                                 |
|  | The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.                                |

## Markup

The following markups are used for a user-friendly text information representation:

Reference to supplementary documentation

 **Remark:** This note gives important information, which must be observed.

- Listings on the first level contain a bullet point
  - Listings on the second level contain a dash

## Instruction

 Instruction

➡ Result of one instruction

## Instruction multilevel

1.  Action step one

2.  Action step two

➡ Result of an instruction

Please comply with the order of the handling instructions.

## 2 Safety instructions

Observe the general safety notes in this chapter and the safety instructions in this documentation. Therewith, you avoid personal danger, damage and errors.

### Keep this instructions!

This operating instruction must be stored and transferred in case of sale during the complete product lifetime.

## 2.1 Important directions on use

### 2.1.1 Intended use

Prerequisites for proper and safe use of the motors are proper transport, appropriate storage, proper assembly and connection, careful maintenance, operation and overhaul.

The motors have been exclusively designed for installation in industrial machinery. The motors have been designed and manufactured in compliance with the directives and harmonized standards specified in the following.

| EU Product standard         |                                                                                            |
|-----------------------------|--------------------------------------------------------------------------------------------|
| EN 60034-1:2010 + Cor.:2010 | Rotating electrical machines - Part 1: Rating and performance (IEC 60034-1:2010, modified) |

### Valid within EU

| EU Directives               |                                                                                                          |
|-----------------------------|----------------------------------------------------------------------------------------------------------|
| 2014/34/EU                  | ATEX Directive 2014/34/EU                                                                                |
| EN Standards                |                                                                                                          |
| EN IEC 60079-0:2018/AC:2020 | Explosive atmospheres - Part 0: Equipment - General requirements (IEC 60079-0:2017)                      |
| EN IEC 60079-7:2015/A1:2018 | Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2015/A1:2017)  |
| EN 60079-31:2014            | Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t" (IEC 60079-31:2013) |

The observance of and compliance with the specifications of the operating instructions (DOK-MOTOR\*-MS2E\*\*\*\*\*-PRRS-\*\*-P) are part of the intended use.

The here described motors are only allowed to be used in an area for components for Group II, Category 3G/3D or Gc, Dc.

- where no explosive atmosphere can occur during **normal operation**, as this is avoided by ventilation and monitoring.
- where explosive atmosphere can occasionally occur in an **event of fault** and this atmosphere can be eliminated and intercepted by the user immediately after occurrence. Thus the explosive atmosphere appears rarely and for a short period of time.

This corresponds to the use of motors in **zone 2** and **zone 22**.

The machine manufacturer must evaluate the electric and mechanic safety as well as environmental influences in the assembled state of the machine according to the Machine Directive 2006/42/EC and DIN EN 60204-1 (safety of machines).

The electrical installation must comply with the protection requirements of EMC Directive 2014/30/EU. The plant manufacturer is responsible for appropriate installation (for example: physical separation of signal and power cables, using shielded cables, ...). The EMC instructions of the converter manufacturer must be observed.

The motors must be left in their original state. It is not allowed to do any constructional modifications. In the case of contravention, applicability according to intended use will expire (e.g. safety technique or ATEX conformity...).

The machine may not be commissioned before conformity with these directives has been confirmed.

### 2.1.2 Unintended use

Any use of the MS2E motors outside of the specified fields of application or under operating conditions and technical data other than those specified in this documentation is considered to be inappropriate use.

Direct operation on the three-phase network is forbidden.

## 2.2 Qualification of personnel

Any work with or on the described product may only be done by qualified or skilled personnel. For the purpose of this manual, qualified personnel means persons who are familiar with transporting, installing, mounting, commissioning and operating the components of the electrical drive and control system and the associated hazards.

Within the meaning of explosion protection, the plant application, selection of devices and their construction must be made by persons whose education contained instruction in several ignition protection types and installation techniques, correct regulations and rules as well as general principles of zoning. The person must be competent to do the mode of work. Qualification of personnel contains knowledge and observance of the specifications in EN 60079-14:2014 Explosive atmospheres - Part 14: Electrical installations design, selection and erection (IEC 60079-14:2013) ( ). The personnel must be trained in regular intervals.

All persons working on, with or in the vicinity of an electrical system must be informed of the relevant safety requirements, safety guidelines and

internal instructions EN 50110-1:2013 (Operation of electrical installations - Part 1: General requirements).

## 2.3 General safety instructions

**Important! Please read all instructions before motor installation.**

Do not install or operate motors or components of the electric drive and control system before you have not carefully read all delivered documents.

Please observe the particular applicable national, local and system-specific regulations, the safety instructions in the documentation and the warning and informative labels on the motors.

**Improper use of the motors and failure to follow the safety instructions in this document may result in material damage, personal injury, electric shock or, in extreme cases, to death!**

In the case of damage due to non-observance of the safety notes, Bosch Rexroth assumes no liability.

Applications for functional safety are only allowed if the motors have the SI-sign on the rating plate.

## 2.4 Product- and technology-dependent safety instructions

### 2.4.1 Protection against explosion hazard



**Product use only in hazardous areas according to the specified labeling on the product**

This product is only allowed to be used in an area of use which is specified on the type plate according to the explosion protection standards. In the case of several ATEX designations labelled on the type plate, likewise gas and dust protection, please observe that during operation only

one hazardous atmosphere occurs (no combination of several). Simultaneous occurrence of gas and dust Ex atmospheres is not permitted.

Do any maintenance in non-hazard atmosphere.

### Observe the conditions on use

Observe the notes in the application conditions and do not exceed the specified limit values.

### Observe residual risks

Specified residual risks and special using conditions must be evaluated by the plant manufacturer and operator according to the product application. This makes own measures necessary to prevent risks.

## 2.4.2 Protection from electric voltage

**Work required on the electric system may only be carried out by skilled electricians. Tools for electricians (VDE tools) are absolutely necessary.**

Before working:

- Enable.
- Secure against reactivation.
- Ensure de-energization.
- Ground and short-circuit.
- Cover or shield any adjacent live parts.

After completing the job, cancel the measures in reverse order.

**Dangerous voltage occurs during operation!  
Danger to life, risk of injury by electric shock!**

- Before start-up, connect the protective conductors on all electric components according to the connection plan.
- Operation, even for short measuring purposes is only allowed with fixed connected protective conductor on the specified points of the components.

## 2.4.3 Protection from mechanical danger

**Dangerous movements! Danger to life, risk of injury, heavy injury or material damage.**

- Do not stay within the motion zone of the machine. Avoid unauthorized access into the danger zone.
- Additionally secure vertical axes to prevent them from sinking or descending after having shutdown the motor, for instance as follows:
  - Mechanically lock the vertical axis,
  - providing an external braking / catching / clamping device, or
  - ensure sufficient weight compensation of the axes.

Only using the serially delivered **motor holding brake** or an external holding brake activated by the drive controller **is not suitable for personal protection!**

**Rotating parts! Danger to life, risk of injury, heavy injury or material damage.**

- Secure key and/or transmission elements against ejection.
- Install covers on dangerous rotating machine parts before start-up.

## 2.4.4 Protection against magnetic and electromagnetic fields

**Health hazard for persons with active body aids or passive metallic implants and for pregnant women.**

Magnetic and electromagnetic fields are created in the direct environment of live conductors or permanent magnets of electro motors and are a serious danger for persons.

Observe the country-specific regulations. For Germany, please observe the specifications of the occupational insurance association BGV B11 and BGR B11 regarding “electromagnetic fields”.

- For persons with active body aids (like heart pacemakers), passive metallic implants (like hip prosthesis) and pregnant women possible hazards exist due to electro magnetic or magnetic fields in direct environment of electric drive and control components and the corresponding live conductors.

Access into these areas can be dangerous for these persons:

- Areas, in which components of electrical drive and control systems and corresponding live conductors are mounted, activated or operated.
- Areas in which motor parts with permanent magnets are stored, repaired or assembled.
- Above mentioned persons must contact their attending physician before entering these areas.
- Please observe the valid industrial safety regulations for plants which are fitted with components of electrical drive and control systems and corresponding live conductors.

#### **Crushing hazard of fingers and hands due to strong attractive forces of the magnets!**

- Handle only with protective gloves.

#### **Risk of destruction of sensitive parts! Data loss!**

- Keep watches, credit cards, check cards and identity cards and all ferromagnetic metal parts, such as iron, nickel and cobalt away from permanent magnets.

### **2.4.5 Protection against ignitable electrostatic discharges**

#### **Danger of explosion due to electrostatic discharge**

Electrostatic discharges may ignite gases, vapors and dust. Electrostatic charges may be caused e.g. by the following processes:

- electrostatic painting
- pneumatically conveyed dust or bulk material

- hydraulically conveyed or flowing liquids and droplets
- mechanically driven belts, brushes and films, etc.

#### **Danger of explosion due to highly charge-generating processes**

Highly charge-generating processes may cause bush discharges or propagating bush discharges and lead to explosions. This must be prevented. This, in turn, may lead to death, severe injury and damage to property.

#### **Carry out cleaning work only with a moist cloth**

Clean the motor with a moist cloth to avoid electrostatic charge. Rubbing with non-conductive materials must be avoided to prevent electrostatic charges resulting in ignition hazards.

### **2.4.6 Protection against burns**

#### **Risk of burns due to hot motor surfaces!**

- Avoid contact with hot motor surfaces. **Temperatures may rise over 60 °C.**
- Allow the motors to cool down long enough before touching them.
- Temperature-sensitive components may not come into contact with the motor surface. Ensure appropriate mounting distance of connection cables and other components.

### **2.4.7 Electrostatic sensitive devices (ESD)**

The motors contain parts which underlie an electrostatic danger. These components, especially temperature sensors of the motor winding can be destroyed by improper use.

Avoid, e.g. direct contact of open wires or contacts of the connection cable of temperature sensors without being electrostatically discharged or grounded.

ⓘ Remark: Do suitable ESD protective measures before you handle imperiled components (e.g. ESD protective clothes, wristlets, conductive floor, grounded cabinets and working surfaces).

## 3 Scope of delivery

The scope of delivery of a MS2E synchronous servomotor contains:

- Motor in original package
- Additional type plate
- Safety notes and instructions on use
- Operating instructions
- Protective coverings for output shaft and connection points
- Accompanying papers

On delivery, immediately verify whether the delivered goods are those specified on the delivery note. The forwarder must be promptly informed of any damage on the packaging and goods, which is detected on delivery. Start-up of damaged goods is prohibited.

The electrical connection is done by means of SpeedCon plug-in connectors in single-cable technique. The permissible ambient temperature range is: 0°C ... 40 °C

## 4 Explosion protection

### 4.1 Product description

Synchronous servomotors of type MS2E03, -04, -05, -06, -07, -10 are used to operate with drive systems. These motors are certified according to ATEX for gas and dust and can be used in zone 2 and 22, Device group II, Category 3. These motors are fitted with three temperature sensors within the winding and an appropriate switch-off electronics to keep the temperature class.

The ignition protection type for gases, vapors is according to the protection principle "Increased safety" **Ex ec**.

The ignition protection type for dust is according to the protection principle "Protection by housing" **Ex tc**.

The housing design is made of aluminum / aluminum die casting. Cooling is done via heat exchange of the open coolant circuit by temperature difference between housing and surrounding coolant (self-cooling).

The motors can be fitted with an additional holding brake and with a Multiturn or Singleturn encoder.

## 4.2 ATEX labeling for MS2E motors (gas)

MS2E motors are suited for use in hazardous areas with gas atmosphere according to the following labeling.

 **II 3G Ex ec IIB T155°C (T3) Gc X**

Table 4: ATEX labeling und significance (gas)

| Sign                                                                              | Meaning                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Symbol Ex                                                                                                                                                                                                                                                                                                       |
| II                                                                                | Equipment group II which is suitable for all potentially explosive areas other than firedamp-endangered excavations                                                                                                                                                                                             |
| 3                                                                                 | Device category 3 means, equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapors, fog, dust/air mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.                                  |
| G                                                                                 | G = Gas                                                                                                                                                                                                                                                                                                         |
| Ex                                                                                | The European standard for explosion protection has been applied.                                                                                                                                                                                                                                                |
| ec                                                                                | Ignition protection type "Increased safety" for EPL Gc                                                                                                                                                                                                                                                          |
| IIB                                                                               | Explosion group                                                                                                                                                                                                                                                                                                 |
| T 155 °C                                                                          | Maximum surface temperature of the motor                                                                                                                                                                                                                                                                        |
| (T3)                                                                              | Temperature class T3 <200°C                                                                                                                                                                                                                                                                                     |
| Gc                                                                                | Device protection level (EPL) classification Gc for advanced safety level for use in potentially gas explosive atmospheres where there is no ignition risk during normal operation or have any additional safety measures which ensure in the event of foreseeable faults/malfunctions no ignition risk exists. |
| X                                                                                 | Labeling "Special conditions on use"                                                                                                                                                                                                                                                                            |

### 4.3 ATEX labeling for MS2E motors (dust)

MS2E motors are suited for use in hazardous areas with gas atmosphere according to the following labeling.

 **II 3D Ex tc IIIC T155°C Dc X**

Table 5: ATEX labeling und significance (dust)

| Sign                                                                            | Meaning                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Symbol Ex                                                                                                                                                                                                                                                                                                   |
| II                                                                              | Equipment group II which is suitable for all potentially explosive areas other than firedamp-endangered excavations                                                                                                                                                                                         |
| 3                                                                               | Device category 3 means, equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapors, fog, dust/air mixtures are unlikely to occur or, if they do occur, are likely to do so only rarely and for a short period only.                                    |
| D                                                                               | D = dust                                                                                                                                                                                                                                                                                                    |
| Ex                                                                              | The European standard for explosion protection has been applied.                                                                                                                                                                                                                                            |
| tc                                                                              | Ignition protection type "Protection by housing" for EPL Dc                                                                                                                                                                                                                                                 |
| IIIC                                                                            | Dust group                                                                                                                                                                                                                                                                                                  |
| T 155 °C                                                                        | Maximum surface temperature of the motor housing                                                                                                                                                                                                                                                            |
| Dc                                                                              | Device protection level (EPL) classification Dc for advanced safety level for use in potentially flammable atmospheres where there is no ignition risk during normal operation or have any additional safety measures which ensure in the event of foreseeable faults/malfunctions no ignition risk exists. |
| X                                                                               | Labeling "Special conditions on use"                                                                                                                                                                                                                                                                        |

### 4.4 Special conditions on use X

The ATEX designation for MS2E motors, specified in the declaration of conformity and on the type plate, is labeled with an "X" at the end. Please observe the following special conditions for a safe operation of the motors in your construction:

#### Ambient temperature

Limited ambient temperature area according to EN IEC 60079-0:2018/AC:2020. The allowed area of ambient temperature for MS2E motors is 0 ... 40 °C (with de-rating 0 ... 60 °C ➔ Chapter 9.5 "Derating in case of deviating ambient conditions." on page 55).

#### Tensile load

Limited values for tensile load according to EN IEC 60079-0:2018/AC:2020. It is not allowed to exceed the specified tensile stress values of the cables connected using connectors. The maximum allowed values are determined in the following context.

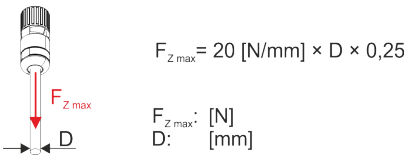


Fig. 1: Determination of maximum tensile load of connection cables

- $F_{Z\ max}$  Tensile load of connection cable (maximum value)
- D Cable outer jacket diameter (maximum value)

⚠ **WARNING**

**Danger of explosion due to exalted tensile load of connection cables**

Adherence of specified limits.

Mechanical fastening of cable ends (e.g. use cable clamps, ...).

Impact strength of plug connectors in the case of mechanical danger

The impact strength of the plug connectors on MS2E motors correspond to a low degree of mechanical danger acc. to EN IEC 60079-0:2018/AC:2020, Tab. 15, line b).

The risk of mechanical endangerment onto the plug-in connectors on motors and cables due to impact from different directions must therefore be evaluated by the user. Possible risks due to a higher degree of endangerment can reduce the mechanical protection of the plug connectors.

The plug-in connectors fulfill the requirements about impact strength according to the following table.

Table 6: MS2E plug-in connector (special conditions: Mechanical hazard

| Plug-in connector | Impact strength of plug-in connectors satisfies low degree of mechanical hazard, in the case of impact from ... |      |       |
|-------------------|-----------------------------------------------------------------------------------------------------------------|------|-------|
|                   | Top                                                                                                             | Side | Below |
| M17 Encoder       | Yes, with assembled plug-in connector protective cover SUP-M02-MS2E                                             |      | No    |
| M23 Hybrid        | yes, with assembled plug connector protective cover SUP-M01-MS2E                                                |      | No    |
| M40 Power         | Yes, with assembled plug-in connector protective cover SUP-M03-MS2E                                             |      | No    |

- During machine construction avoid possible impacts onto the electric connections and plug connectors.
- Do a risk evaluation about mechanical hazard for connectors on motors and cables in the machine due to impacts from different directions.
- If necessary, assemble the plug connector protective cover SUP-M0x-MS2E.
- Avoid impacts onto the plug-in connectors if there is a higher degree of mechanical danger due to additional devices or design changes to the machine.

⚠ **WARNING**

**Danger of explosion due to mechanical hazard of plug connectors.**

Provide arrangements to protect the plug-in connector mechanically (e.g. covers, protective plates, ...).

To protect the plug connector, Rexroth offers plug connector protective cover as an optional accessory, see➔ Chapter 8.3.9 “Plug connector protective cover” on page 50.

Avoid electrostatic charge resulting in propagating brush discharges

The type plate and the warning labels of MS2E motors are made of plastic foil and limited conducting (disruptive voltage > 4 kV, see EN IEC 60079-0:2018/AC:2020). Follow the instructions below.

⚠ **WARNING**

**Danger of explosion due to propagating brush discharges**

Do a risk evaluation about occurrence of highly charge-generating processes with the danger of propagating brush discharges.

Avoid propagating brush discharges or provide measures to avoid propagating brush discharges.

➔ Chapter 2.4.5 “Protection against ignitable electrostatic discharges” on page 20

## Maintenance and repair

Maintenance and repair of motors must exclusively be done by the certified Rexroth service.

## 4.5 Conditions for use of MS2E motors in Equipment Group II, Category 3.

### ⚠ WARNING

**Explosion hazard and danger to life, or substantial property damage!**

All used **components and accessory parts** must fulfill the requirements for explosion protection according to the 2014/34/EU directive.

The **conditions on use** given in this documentation must be taken into account for any project planning and be observed during operation.

### 4.5.1 Maximum housing temperature

The maximum housing temperature is 155 °C on the motor housing at an ambient temperature of 40 °C. The ignition temperatures of substances coming into contact with the motors must not fall below 155 °C. Observe external heat and cooling sources when determining the operation temperature. Project-specific electrical/thermal evaluations must be carried out by the customer if they deviate from the Bosch Rexroth specification. If necessary, project-specific metrological verifications are required that reflect the actual ambient conditions at the place of use. Among other things, external heat sources or cold sources must be considered here

### 4.5.2 Connection conditions

The motors can be operated with Rexroth controllers (ctrlX / IndraDrive). In the case of using drive controllers of other manufacturers, the following special conditions must be fulfilled → Chapter 9.6 "Operation on foreign converters" on page 57.

### 4.5.3 Plug-in connectors

Make sure the environment is dry and clean when connecting or disconnecting connectors.

Ignition sparks can occur, when motor connectors are disconnected or connected under load.

### ⚠ WARNING

**Risk of personal injury or damage to property due to disconnecting or connecting live plug connections!**

- Only disconnect or connect plug connections when they are dry, clean and de-energized.
- During operation of the system, all plug connections must be firmly locked or screwed tight.

### 4.5.4 Ground conductor

The motors must be grounded via a motor cable and via a second separate ground conductor with minimum **4 mm<sup>2</sup>** cross section. Check the proper installation of the protective and ground conductor connection before startup.

- Protective conductor motor cable
- Ground conductor see → Chapter 8.3.6 "Ground connection" on page 50

The redundant protective conductor installation ensures a safe drain of occurring discharge currents even in error case (e.g. at interrupted protective conductor).

### 4.5.5 Corrosion

Prevent motor corrosion which can occur due to aggressive substances like certain coolants and lubricants as well as cutting oils or salt mist.

### 4.5.6 Switch-off

Energies stored in the intermediate circuit have to be reduced or insulated as soon as possible through the activation of the emergency stop device, so that in the case of a failure the risk of an effect into the danger zone is reduced (ATEX directive 2014/34/EU).

For example, this can be achieved as follows:

- Reduce the energy via an intermediate short circuit. For information about the function "Intermediate short circuit" please refer to Indradrive documentation. When using foreign converters refer to the manufacturer.
- Isolation of the energies before they are transferred into the potentially explosive atmosphere by isolating the voltage of the lines and motors present in the potentially explosive atmosphere.

### 4.5.7 Holding brake

Use the optional holding brake in **normal operation** only in standstill time.

#### Malfunction

Only in an **event of fault**, i.e. in the case of a fault in the system, may the brake be activated when the motor is turning, e.g. in order to prevent a dangerous lowering of vertical axes. In this case, sparks may be generated in the brake and increased temperatures may occur within the motor. When a fault occurs, the operator must eliminate it immediately.

#### Functional test

Before commissioning and when operating the motor periodically, the functions of the brake are to be tested with a suitable braking test according to the risk analysis of the plant operator. Further information and data can be found in the respective functional descriptions of the drive controller firmware.

For further general notes about holding brakes see ➔ [Chapter 6.2.8 "Holding brake" on page 36](#).

### 4.5.8 Acceptance test

Before initial start-up of the system or after changing a motor, check your installation with regard to the directives according to EN IEC 60079-0:2018/AC:2020. The acceptance report must confirm compliance with the instructions and conditions of use given here.

### 4.5.9 Residual risks

The existing residual risks are to be observed by the user, when the installation is designed.

- Overstress
  - When the motor is overloaded, including cases where errors in the mechanical or electrical equipment of the machine cause such overloading, high temperatures may occur that result in explosion hazards.
- Operation in explosive dust atmosphere.
  - An operation in explosive dust-atmosphere can build a layer on the motor during a residence time, which does no longer ensure a sufficient motor cooling.
- Grounding and discharge currents
  - Variable-speed drive systems cause unavoidable discharge currents. Please observe a proper installation of protective conductor and potential equalization line. In the case of interrupted protective conductor and potential equalization line due to occurring error cases during operation or faulty connections can raise sparks on transition points.
- Temperature control
  - The failure of the single-channel temperature monitor in the device system may occur, as the result of an error, and might

not be detected, even if the motor is operated within the normal temperature range and load cycle.

## 5 Identification

### 5.1 Type plate

The type plate contains all essential electrical data, the serial number, date of manufacture, mark of conformity as well as the information provided by the manufacturer.

|                                                                                                                   |                                                                                   |                                                                                                                |                                                                                   |                                                                                   |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>rexroth</b>                                                                                                    | 3-PHASE PM-MOTOR                                                                  |                                                                                                                |                                                                                   | (7260)                                                                            |
| TYP: MS2E05-C0BTN-CSSK1-NNNNN-NN                                                                                  | FD: 19W24                                                                         |                                                                                                                |                                                                                   |                                                                                   |
| MNR: R911373589                                                                                                   | SN: Z260703123456                                                                 | AA1                                                                                                            | m 7.0 kg                                                                          |                                                                                   |
| M(0) 6.1 Nm<br>I(0) 7.1 A                                                                                         |  |                               |  |  |
|                                                                                                                   | Brake 10.0 Nm                                                                     | DC 24 V                                                                                                        | +10% 0.73 A                                                                       | IP65                                                                              |
| P(N) 0.99 kW<br>I(N) 3.76 A                                                                                       | n(N) 3130 min-1<br>U(max) AC 600 V                                                | Inverter Duty VPM                                                                                              |                                                                                   | T.CL. 155<br>I.SY. ECM1                                                           |
|  II 3G Ex ec IIB T155°C(T3) Gc X |                                                                                   |  II 3D Ex tc IIIC T155°C Dc X |                                                                                   |                                                                                   |
| Made in Germany                                                                                                   |                                                                                   | Bosch Rexroth AG, DE-97816 Lohr                                                                                |                                                                                   | Hotline: +49 9352 405060                                                          |

Fig. 2: Type plate MS2E (example)

Table 7: Type plate specification MS2E

| Symbol                                                                              | Meaning                                                    |
|-------------------------------------------------------------------------------------|------------------------------------------------------------|
| TYPE                                                                                | Motor type                                                 |
| SN                                                                                  | Serial number                                              |
| P(N)                                                                                | Rated power - 60 K                                         |
| I(N)                                                                                | Rated current - 60 K                                       |
| n(N)                                                                                | Rated speed - 60 K                                         |
| M(0)                                                                                | Standstill torque - 60K                                    |
| I(0)                                                                                | Standstill current - 60K                                   |
|  | ATEX labeling explosion protection (gas)                   |
|  | ATEX labeling explosion protection (dust)                  |
| Brake                                                                               | Holding brake data (optional)                              |
| FD                                                                                  | Manufacturing date                                         |
| n(max)                                                                              | Maximum speed                                              |
| U(max)                                                                              | Maximum voltage UL                                         |
| IP65                                                                                | Degree of protection IPxx                                  |
| m                                                                                   | Mass                                                       |
| T.CL.                                                                               | Thermal class                                              |
| I.SY.                                                                               | Insulation system identification                           |
| SI                                                                                  | Use in systems for "Integrated Safety Technology" prepared |

The following marks of conformity are used:

Table 8: Meaning of marks of conformity

| Certification mark                                                                | Meaning                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | The UL Recognized Component Mark (UL recognized) identifies recognized component parts which are components of a bigger product or system. The recognition relates on Standards UL 1004-1 „Rotating electrical machines –General requirements“, UL 1004-6 „Servo and stepper motors“, CSA C22.2 No. 100 „Motors and generators“. |
|  | The CE-marking confirms the conformity of a product with relevant EC-regulations.<br>The conformity of MS2E motors is confirmed according to Low voltage directive 2014/35/EU ATEX directive 2014/34/EU, EN 60034-1 and EN 60034-5.                                                                                              |
|  | Motors labelled with the symbol EFUP 25 (environmental-friendly use period) can be used for 25 years as intended before substances limited in their concentration according to China RoHS2 may leak and subsequently pose a risk to environment and health.                                                                      |

### 5.2 Type code

The type code is printed onto the type plate of the motor. For the meaning of the type code refer to the following details.

#### Type codes, meaning of the digits

MS2E06 - C0BRN - CMSG1 - NNNNNN - NN

|    |                                                   |   |   |    |    |    |    |    |
|----|---------------------------------------------------|---|---|----|----|----|----|----|
| 1  | 3                                                 | 5 | 7 | 9  | 11 | 13 | 15 | 17 |
| 2  | 4                                                 | 6 | 8 | 10 | 12 | 14 | 16 |    |
| 1  | Product                                           |   |   |    |    |    |    |    |
| 2  | Frame size                                        |   |   |    |    |    |    |    |
| 3  | Frame length                                      |   |   |    |    |    |    |    |
| 4  | Characteristics of moment of inertia of the rotor |   |   |    |    |    |    |    |
| 5  | Winding code                                      |   |   |    |    |    |    |    |
| 6  | Cooling                                           |   |   |    |    |    |    |    |
| 7  | Encoder performance                               |   |   |    |    |    |    |    |
| 8  | Encoder design                                    |   |   |    |    |    |    |    |
| 9  | Electrical connection                             |   |   |    |    |    |    |    |
| 10 | Shaft                                             |   |   |    |    |    |    |    |
| 11 | Holding brake                                     |   |   |    |    |    |    |    |
| 12 | Flange exactness                                  |   |   |    |    |    |    |    |
| 13 | Bearings                                          |   |   |    |    |    |    |    |
| 14 | Frame size                                        |   |   |    |    |    |    |    |
| 15 | Coating                                           |   |   |    |    |    |    |    |
| 16 | Other design                                      |   |   |    |    |    |    |    |

| Type codes, meaning of the digits |                |
|-----------------------------------|----------------|
| 17                                | Special design |

# 6 About this product

## 6.1 Safety instructions on the product

Please note the safety and prohibitive sign on the motor. The sign significance is explained in the following.

Table 9: Safety instructions on the product

| Information | Meaning |
|-------------|---------|
|-------------|---------|



### Hot surfaces with temperatures over 60 °C may cause burns

Let the motors cool down before working on the motors or in close proximity to the motors. The thermal time constant stated in the technical data is a measure for the cooling time. Cooling down can require up to 140 minutes.

- Wear safety gloves.
- Do not work on hot surfaces.



### Motor damage due to strikes onto the motor shaft

Do not strike the shaft end and do not exceed the allowed axial and radial forces of the motor.

### WARNING

#### RISK OF EXPLOSION!

- DO NOT SEPARATE WHEN ENERGIZED
- POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS
- DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT
- Motor cables must have a minimum temperature stability of 80 °C (176 °F)

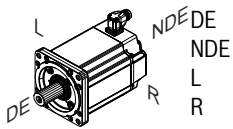
### WARNING

#### Explosion hazard!

- NEVER DISCONNECT PLUG CONNECTORS UNDER LOAD
- DANGER DUE TO ELECTROSTATIC DISCHARGES - SEE OPERATING INSTRUCTIONS
- DO NOT OPEN INSIDE A POTENTIALLY EXPLOSIVE ATMOSPHERE
- Use motor cables with a thermal stability of at least 80 °C (176 °F)

## 6.2 Features and functions

### 6.2.1 Basic data

|                                             |                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>                              | 3~ PM motor                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Type</b>                                 | MS2E                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Ambient temperature during operation</b> | 0 ... 40 °C (without de-rating)                                                                                                                                                                                                                                                                                                                                                   |
| <b>Type of protection</b>                   | IP65 with shaft sealing ring (EN 60529:1991 + A1:2000 + A2:2013)                                                                                                                                                                                                                                                                                                                  |
| <b>Cooling mode</b>                         | IC410, Self-cooling (EN 60034-6:1993)                                                                                                                                                                                                                                                                                                                                             |
| <b>Motor design</b>                         | IM B5 (EN 60034-7:1993 + A1:2001)                                                                                                                                                                                                                                                                                                                                                 |
| <b>Coating</b>                              | Varnish RAL 9005                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Flange</b>                               | similar to DIN 42948:1965-11                                                                                                                                                                                                                                                                                                                                                      |
| <b>Shaft end</b>                            | Cylindrical (DIN 748-3), centering hole with thread "DS" (DIN 332-2:1983-05),<br>With keyway (half key balancing according to ISO 21940-32:2012)                                                                                                                                                                                                                                  |
| <b>Concentricity, run-out, alignment</b>    | Standard tolerance N (DIN 42955:1981-12)                                                                                                                                                                                                                                                                                                                                          |
| <b>Oscillating quantity level</b>           | Level A (EN 60079-14:2014) up to rated speed                                                                                                                                                                                                                                                                                                                                      |
| <b>Installation altitude</b>                | 0 ... 1,000 m above MSL (without derating)                                                                                                                                                                                                                                                                                                                                        |
| <b>Sound pressure level</b>                 | MS2E03 ... MS2E10: 75 dB(A) +3 dB(A)                                                                                                                                                                                                                                                                                                                                              |
| <b>Thermal class</b>                        | 155 (F) (EN 60034-1)                                                                                                                                                                                                                                                                                                                                                              |
| <b>Encoder system</b>                       | <b>Advanced Performance ACURO®link</b><br>Optical absolute value encoder 20 bit, digital in single or multiturn variant<br><br><b>High performance ACURO®link</b><br>Optical absolute value encoder 24 bit, digital in Single- or Multiturn design                                                                                                                                |
| <b>Electrical connection</b>                | M23 <b>Single cable connection</b> , (rotatable, quick lock SPEEDCON®)<br><br><b>Double cable connection</b> (only MS2E10) with<br>M40 Power connectors (rotatable, quick lock SPEEDCON®)<br>Encoder connector M17 (rotatable, quick lock SPEEDCON®)                                                                                                                              |
| <b>Holding brake (option)</b>               | Electrically released U <sub>N</sub> 24V DC (±10%)                                                                                                                                                                                                                                                                                                                                |
| <b>Motor ends</b>                           |  <div style="display: inline-block; vertical-align: top; margin-left: 10px;"> <p>DE</p> <p>NDE</p> <p>L</p> <p>R</p> </div> <div style="display: inline-block; vertical-align: top; margin-left: 20px;"> <p>Drive End, A-side</p> <p>Non Drive End, B-side</p> <p>Left</p> <p>Right</p> </div> |

⚠ Remark: In the case of special design, details named in the operating instructions can deviate. In this case, order the supplementary documentation.

### 6.2.2 Mechanical interfaces

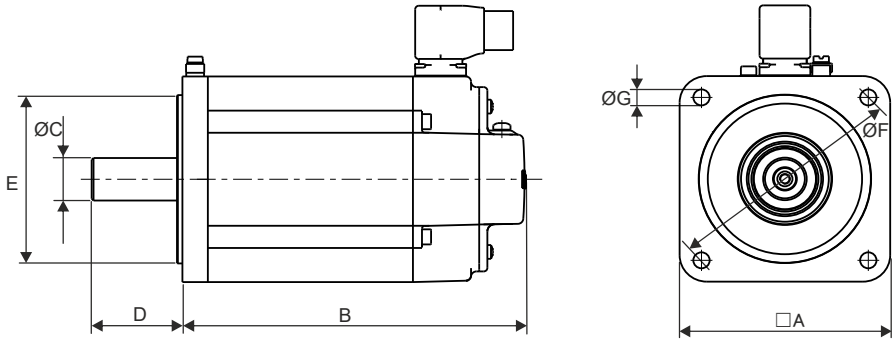


Table 10: Mechanical interface flange, shaft

| Type     | A<br>Flange<br>[mm] | B<br>Length<br>[mm] | C<br>Shaft<br>$\varnothing$ [mm] | D<br>Shaft<br>length<br>[mm] | E<br>Centering<br>collar<br>[mm] | F<br>Hole circle<br>[mm] | G<br>Mounting<br>holes<br>[mm] |
|----------|---------------------|---------------------|----------------------------------|------------------------------|----------------------------------|--------------------------|--------------------------------|
| MS2E03-B | 58                  | *)                  | 9                                | 20                           | 40                               | 63                       | 4.5                            |
| MS2E03-D | 58                  | *)                  | 11                               | 23                           | 40                               | 63                       | 4.5                            |
| MS2E04   | 82                  | *)                  | 14                               | 30                           | 50                               | 95                       | 6.6                            |
| MS2E05   | 98                  | *)                  | 19                               | 40                           | 95                               | 115                      | 9                              |
| MS2E06   | 116                 | *)                  | 24                               | 50                           | 95                               | 130                      | 9                              |
| MS2E07   | 140                 | *)                  | 32                               | 58                           | 130                              | 165                      | 11                             |
| MS2E10   | 196                 | *)                  | 38                               | 80                           | 180                              | 215                      | 14                             |

\*) see specifications

Table 11: Tightening torque of mounting screws

| Screw                                          | M4  | M6   | M8   | M10 | M12 | M14 |
|------------------------------------------------|-----|------|------|-----|-----|-----|
| Mounting holes $\varnothing$ [mm]              | 4.5 | 6.6  | 9    | 11  | 14  | 18  |
| Tightening torque $M_A$ [Nm] at $\mu_K = 0.12$ | 3.0 | 10.1 | 24.6 | 48  | 84  | 206 |
| Washer DIN EN ISO 28738                        | -   | -    | yes  | yes | yes | yes |

1. Use specified screws and washers for fastening the motors.
2. Tighten the screws with the specified torque.

### 6.2.3 Thermal motor protection

The motor temperature is monitored by two systems that are operated independently of each other. The mounted **temperature sensor** and the drive-internal **temperature model** ensure the best protection of motors against thermal overload.

The threshold values for motor temperature monitoring are contained in the encoder data memory and are read in and monitored automatically during the operation with Rexroth controllers. Threshold values for MS2E motors are:

- Motor-warning temperature (125°C)
- Motor-disconnection temperature (130°C)

Table 12: MS2E temperature sensor

| Motor                      | Temperature sensor |
|----------------------------|--------------------|
| MS2EXX-XXXXX-XXXX-XXNXX-XX | PT1000             |

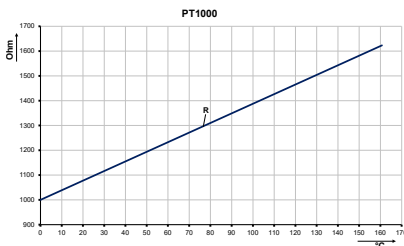


Fig. 3: Characteristic curve PT1000

In case of motors with digital encoder (E/F), the resistance values are transmitted digitally via the encoder interface (cyclic communication).

### 6.2.4 Cooling mode

#### Self-cooling (IC410)

In case of self-cooling motors, the heat dissipation is realized via natural convection and radiation to the ambient air as well as by heat conduction to the machine construction.

The specified nominal data is reached at ambient temperatures of up to 40 °C. Unhindered vertical convection has to be ensured by a sufficient distance of 100 mm to adjacent components. Any usage at increased ambient temperature (0 ... 60°C) is possible. Please note the details in [Chapter 9.5 "Derating in case of deviating ambient conditions."](#) on page 55.

Pollution of the surface of the motor reduces heat dissipation and can result in thermal overload. The availability of the system can be increased by regular checks and cleaning of the motors. Please ensure access to the motors for maintenance purposes.

## 6.2.5 Encoder

ADVANCED-Encoder "**Cx**" use an optical sampling method. Data output of process and parameter data (electronic type plate) happens digitally via ACURO®link-Protocol. The encoder "**Cx**" fulfills the specification for safety technique according to SIL 2 and PL d. Temperature signals are transmitted digitally via the encoder interface.

HIGH-Geber "**Dx**" uses an optical sampling method. Data output of process and parameter data (electronic type plate) happens digitally via ACURO®link-Protocol. The encoder "**Dx**" fulfill the specifications for safety technique according to SIL 3 and PL e. Temperature signals are transmitted digitally via the encoder interface.

The singleturn design allows absolute, indirect position recording within one mechanical motor rotation.

The multiturn design allows absolute, indirect position recording within 4096 mechanical motor rotations.

## Technical data of encoder

Table 13: Technical data of encoder

| Designation                                   | Symbol                 | Unit | Encoder    |    |            |    |
|-----------------------------------------------|------------------------|------|------------|----|------------|----|
|                                               |                        |      | CM         | CS | DM         | DS |
| Encoder interface                             | -                      | -    | ACURO@link |    |            |    |
| Functional encoder resolution (singleturn)    |                        | -    | 20 bit     |    | 24 bit     |    |
| Distinguishable rotations                     | U <sub>turn</sub>      | -    | 4096       | 1  | 4096       | 1  |
| System accuracy of encoder <sup>1</sup>       | ✱                      | "    | ± 36       |    | ± 20       |    |
| System accuracy typical/maximum <sup>2)</sup> | ✱                      | "    | ±50 / ± 70 |    | ±20 / ± 30 |    |
| Encoder voltage supply                        | VCC <sub>Encoder</sub> | V    | 7...12     |    |            |    |
| Encoder max. current consumption              | I <sub>Encoder</sub>   | mA   | 60         |    | 130        |    |
| Functional safety                             |                        |      |            |    |            |    |
| Safety integrity level                        |                        | -    | SIL 2      |    | SIL 3      |    |
| Performance level                             |                        | -    | PL d       |    | PL e       |    |

**SAFETY**  
Note

1) The installation mechanics can sporadically influence the accuracy of the overall system.

2) Reachable overall system accuracy by taking the installation mechanics into consideration, typical and maximum value.

For additional notes about integrated safety technique and prerequisites for using motors with encoder systems for using safety technique with IndraDrive refer to **Rexroth IndraDrive Integrated Safety Technology "Safe Motion" DOK-INDRV\*-SI3\*SMO-VRS-APxx-xx-P**.

### 6.2.6 Degree of protection

The protection type according to EN 60529:1991 + A1:2000 + A2:2013 is determined by the abbreviation IP (International Protection) and two code numbers for the degree of protection. The first reference number stands for the degree of protection against contact and ingress of foreign bodies, the second one stands for the degree of protection against ingress of water.

Standard motors (specification according to type plate)

- **IP65** with shaft sealing ring

### 6.2.7 Output shaft, balancing and extension elements

#### Shaft end

Table 14: Options according to type code

| Shaft                           | Type |
|---------------------------------|------|
| Smooth, with shaft sealing ring | G    |

| Shaft                           | Type |
|---------------------------------|------|
| Keyway, with shaft sealing ring | K    |

#### Smooth shaft

Cylindrical shaft end according to DIN 748-3 with frontal centering hole with "DS" thread according to DIN 332-2.

The standard design for a non-positive shaft-hub connection without play and excellent smooth running. Use clamping sets, pressure sleeves or clamping elements for coupling the machine elements to be driven.

#### Shaft with keyway

Cylindrical shaft end according to DIN 748-3 with frontal centering hole with "DS" thread according to DIN 332-2 and keyway.

The keyway design allows form-locking transmission of torques with constant direction and low requirements on the shaft-hub connection.

The machine elements to be driven have to be secured in axial direction via the centering hole.

Table 15: Keyway and centering holes

| Type     | Key DIN 6885-A | Centering hole DIN 332 Part 2 |
|----------|----------------|-------------------------------|
| MS2E03-B | 3×3×14         | DS M3                         |
| MS2E03-D | 4×4×16         | DS M4                         |
| MS2E04   | 5×5×20         | DS M5                         |
| MS2E05   | 6×6×32         | DS M6                         |
| MS2E06   | 8×7×40         | DS M8                         |
| MS2E07   | 10×8×45        | DS M10                        |
| MS2E10   | 10×8×70        | DS M12                        |

 **Remark:** Keys are not included in the scope of delivery.

We recommend regular visual inspections on shaft sealing rings. Depending on operating conditions, signs of wear may appear after 5,000 operating hours. If necessary, replace the shaft sealing rings.

 **Remark:** We recommend to have these repairs made by Bosch Rexroth Service.

**Balancing**

MS2E motors with key are balanced with “half key”. Half key balancing according to DIN ISO 21940-32.

The balancing type is specified at the shaft front end with “H” for half key balancing.

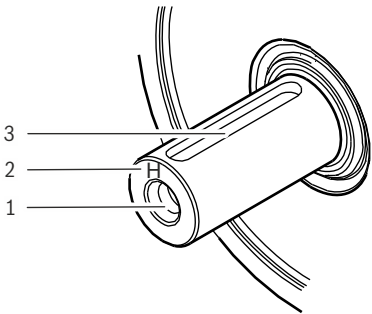


Fig. 4: Shaft end

- 1 Centering hole
- 2 Labeling balancing
- 3 Keyway

**Attachment of drive elements**

Observe the notes about mounting drive elements.

**Explosion protection**

When mounting drive elements, check their suitability and keep the ATEX directives during operation. Selecting of all mounting components underlies the sole responsibility of the plant manufacturer or operator.

**⚠ WARNING**

**Explosion hazard and danger to life, or substantial property damage!**

The totality of a motor-machine combination must comply with the specifications for explosion protection according to Directive 2014/34/EU.

Please observe the notes within the product documentation of the used components when projecting and during operation.

Gearboxes with approvals for use in hazardous areas according to Directive 2014/34/EU for the attachment to MS2E motors are delivered by Rexroth neither separately nor mounted on motors.

### ⚠ CAUTION

#### Ingressing fluid may damage the motor!

Fluids (e.g., cooling lubricants, gear oil, etc.) may not be present at the output shaft.

When attaching gearboxes, only use gearboxes with a closed (oil-tight) lubrication system. Gearbox oil should not be in permanent contact with the shaft sealing ring of the motors.

- a shift in the position of the axis, if the driving pinions are not axially fixed on the machine side.
- a thermally dependent component of the axial force, if the driving pinions are axially fixed on the machine side. This causes the risk of exceeding the maximum permissible axial force or of the gear backlash increasing to an impermissible degree.
- Damage of the NDE bearing by exceeding the maximum permissible axial force.

 **Remark:** It is recommended to use drive elements with integrated bearings and mount them on the motor shaft via axially compensating couplings.

### Overdetermined bearing

When installing drive elements, avoid overdetermined bearing as impermissibly high bearing reactions can be generated due to unfavorable tolerance ratios.

 **Remark:** If overdetermined arrangement of bearings cannot be avoided, please contact Bosch Rexroth.

### Couplings

The machine construction and the drive elements used must be carefully adapted to the motor type so as to make sure that the load limits of the shaft and the bearing are not exceeded.

 **Remark:** When extremely stiff couplings are attached, the revolving radial force may cause an impermissibly high load on the shaft and bearing.

### Bevel gear pinion or helical drive pinion

Due to thermal expansion, the DE side of the drive shaft can be displaced by up to 0.6 mm in relation to the motor housing. If helical drive pinions or bevel gear pinions directly attached to the output shaft are used, this change in the lengths will lead to

## 6.2.8 Holding brake

### ⚠ WARNING

**Danger to life or high damage to property, ignition and explosion hazard due to inappropriate use!**

In order to prevent danger due to ignitable gases or explosive dust-air mixtures in the vicinity of the motors, the user must make sure that the holding brake does not present a source of ignition in the normal service. For this reason, the holding brake must never be used outside the design parameters and operating conditions!

- Any commissioning and maintenance works must only be carried out in non-explosive environments.
- The brakes must be designed so as to fulfill their function in normal service, if they are installed and used as intended.
- The holding brake integrated in the motor must only be used at standstill and never as EMERGENCY STOP brake to stop the motor, see P-0-0119, Optimal shutdown (Indra-Drive firmware - functional description).
- The holding brake must not be used to brake or stop the motor or coupled loads from higher speeds or velocities.

MS2E motors can optionally be provided with permanent magnet brakes. The backlash-free holding brakes are operated according to the “electrically-released” principle (closed-circuit principle) and open upon applying the switching voltage.

- Number of operating cycles  $\geq 5,000,000$
- The holding brakes with emergency stop function are intended to secure motor shafts at standstill (normal operation). **The holding brakes are no operation brakes to decelerate motors in operation from speed.**
- Emergency stop situations are not a normal operation.
- In case of an emergency stop or voltage drop, the brake operation is only allowed to a limited extend. Up to 500 breaking cycles from speed 3000 1/min can be performed, whereas the maximum switched energy per emergency stop of the brake must not be exceeded. The number of brake applications per hour is 20, whereas a uniform scheduling is a precondition. For specifications about the max. switched energy per emergency stop, see ➔ Chapter “Technical data holding brakes” on page 38
- Idle time after an emergency stop before restarting  $\geq 3$  minutes.

#### ⚠ CAUTION

##### Malfunctions due to wear

Impermissibly high wear due to breaking from speed by exceeding the specified emergency stop properties.

Ensure the functionality of the brake in normal operation, due to voltage control, current monitoring, cyclic control of the brake holding torque, for example.

The rated voltage to apply the brakes is 24VDC $\pm$ 10%.

The voltage supply of the holding brake has to be designed so as to guarantee under the worst installation and operation conditions that a sufficient voltage **24VDC $\pm$ 10%** is available at the motor in order to release the holding brake.

The voltage drop  $\Delta U$  on the brake supply can approximately be calculated for copper conductors using the following formula:

$$\Delta U = \rho_{Cu} \cdot \left( \frac{2 \cdot l}{q} \right) \cdot I_N$$

Fig. 5: Voltage drop of brake supply for Cu (copper) conductor

$\Delta U$  Voltage drop [V]

$\rho_{Cu}$  Specific resistance of copper [ $\Omega \cdot \text{mm}^2/\text{m}$ ]

$l$  Cable length [m]

$q$  Conductor cross-section [ $\text{mm}^2$ ]

$I_N$  Rated current [A]

#### ⚠ CAUTION

##### Malfunction in case of exceeded tolerance of the rated voltage (switching voltage)

For safe switching of the holding brake, a rated voltage of **24 VDC  $\pm$ 10%** is required at the motor.

Ensure correct dimensioning of the supply wires (wire length and cross-section) for the holding brake.

The control voltage can be reduced using the energy saving function after safely releasing the brake, see ➔ Chapter “Energy saving function for holding brakes” on page 39.

The holding brake in the motor is intended for direct connection to the IndraDrive controller.

The protective circuit for switching holding brakes (inductive load) is not integrated in the MS2E motors; in Bosch Rexroth drive systems it is integrated in the control units.

## Technical data holding brakes

Table 16: Technical data holding brakes

| Type                | Holding torque       | Dynamic braking torque | Rated voltage <sup>1)</sup> | Rated current       | Maximum connection time | Maximum disconnection time | Maximum switched energy |
|---------------------|----------------------|------------------------|-----------------------------|---------------------|-------------------------|----------------------------|-------------------------|
|                     | M <sub>4</sub><br>Nm | M <sub>1</sub><br>Nm   | U <sub>N</sub><br>V         | I <sub>N</sub><br>A | t <sub>1</sub><br>ms    | t <sub>2</sub><br>ms       | W <sub>max</sub><br>J   |
| MS2E03-B - - 1- - - | 1.80                 | 1.3                    | 24                          | 0.46                | 8                       | 35                         | 300                     |
| MS2E03-D - - 1- - - | 1.80                 | 1.3                    | 24                          | 0.46                | 8                       | 35                         | 300                     |
| MS2E04-B - - 1- - - | 5.00                 | 4.5                    | 24                          | 0.63                | 30                      | 45                         | 400                     |
| MS2E04-C - - 1- - - | 5.00                 | 4.5                    | 24                          | 0.63                | 30                      | 45                         | 400                     |
| MS2E05-B - - 1- - - | 10.00                | 4.5                    | 24                          | 0.73                | 30                      | 80                         | 400                     |
| MS2E05-C - - 1- - - | 10.00                | 4.5                    | 24                          | 0.73                | 30                      | 80                         | 400                     |
| MS2E05-D - - 1- - - | 10.00                | 4.5                    | 24                          | 0.73                | 30                      | 80                         | 400                     |
| MS2E06-C - - 1- - - | 10.00                | 4.5                    | 24                          | 0.73                | 30                      | 80                         | 400                     |
| MS2E06-D - - 2- - - | 15.00                | 11                     | 24                          | 0.75                | 50                      | 135                        | 888                     |
| MS2E06-E - - 2- - - | 15.00                | 11                     | 24                          | 0.75                | 50                      | 135                        | 888                     |
| MS2E07-C - - 1- - - | 20.00                | 12.5                   | 24                          | 0.78                | 40                      | 100                        | 340                     |
| MS2E07-D - - 2- - - | 36.00                | 16.5                   | 24                          | 0.94                | 60                      | 200                        | 850                     |
| MS2E07-E - - 2- - - | 36.00                | 16.5                   | 24                          | 0.94                | 60                      | 200                        | 850                     |
| MS2E10-C - - 2- - - | 53.00                | 23                     | 24                          | 1.00                | 70                      | 220                        | 850                     |
| MS2E10-D - - 2- - - | 53.00                | 23                     | 24                          | 1.00                | 70                      | 220                        | 850                     |
| MS2E10-E - - 3- - - | 90.00                | 33                     | 24                          | 1.50                | 65                      | 250                        | 1470                    |

1) Tolerance ± 10%

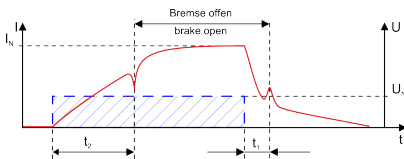


Fig. 6: Switching times of static hold mode

t<sub>1</sub> Connection time (close)

t<sub>2</sub> Disconnection time (open)

## Sizing holding brakes

### Static sizing

Check the load torque (M<sub>6</sub>) with the available holding torque (M<sub>4</sub>). The load torque has to be smaller than the holding torque. In case of unsafe assumed load, use a sufficient safety factor.

$$M_4 \geq S \cdot M_6$$

Fig. 7: Static load torque

M<sub>4</sub> Brake torque [Nm]

M<sub>6</sub> Load torque [Nm]

S Safety factor

### Dynamic sizing if emergency stop

In case of an emergency stop, the load torque (M<sub>6</sub>) has to be smaller than the minimum dynamic torque (M<sub>1</sub>) of the brake. Otherwise the dynamic brake torque is not sufficient to set the axis to standstill.

$$M_1 \geq S \cdot M_6$$

Fig. 8: Dynamic load torque

$M_1$  Dynamic torque [Nm]  
 $M_6$  Load torque [Nm]  
 $S$  Safety factor

If a mass has to be decelerated within a specified time or after a certain distance, the additional mass moment of inertia of the complete system ( $J_{ges}$ ) has to be taken into consideration.

$$t_{Br} = \frac{J_{ges} \cdot n}{9,55 \cdot (M_1 \pm M_6)}$$

Fig. 9: Shutdown time

$t_{Br}$  Deceleration time [s]  
 $n$  Nominal speed [1/min]  
 $M_1$  Dynamic torque [Nm]  
 $M_6$  Load torque [Nm]  
 $J_{ges}$  Moment of inertia of complete system [kgm<sup>2</sup>]  
 $J_{rot}$  Moment of inertia of motor [kgm<sup>2</sup>]  
 $J_{fremd}$  External inertia [kgm<sup>2</sup>]

The specified formula refers to idealized, linear correlations and can thus only be used for estimation purposes. A load torque  $M_6$  inhibiting the brake application is displayed with “-”, a brake application supporting the load torque  $M_6$  is displayed with “+”.

## Thermal dimensioning

The brake can be thermally overexerted due to multiple repetitive brake applications (breaking capacity).

$$W_{max} > \frac{M_1}{M_1 - M_6} \cdot \frac{J_{ges} \cdot n^2}{182,5}$$

Fig. 10: Maximum switched energy

$W_{max}$  Maximum switched energy [J]  
 $n$  Nominal speed [1/min]  
 $M_1$  Dynamic torque [Nm]  
 $M_6$  Load torque [Nm]  
 $J_{ges}$  Moment of inertia of complete system [kgm<sup>2</sup>]

## Energy saving function for holding brakes

### Decrease brake voltage

The control voltage of the holding brake in MS2E holding brakes can be reduced after executing the switching operation “Open brake” by using control modules (e.g. brake control module HAT02.1-003). By decreasing the control voltage, energy can be saved of up to 50% and the self-heating of the motor can be reduced.

To decrease the control voltage of MS2E holding brakes, the following conditions apply:

- Maximum decrease of control voltage to  $U_N \geq 17$  V DC at the motor.
- Waiting time after releasing the holding brake is at least 200 ms
- Decreasing the control voltage by voltage control or pulse width modulation with a PWM cycle frequency  $\geq 4$  kHz
- Ensure the functionality of the holding brake.

**Remark:** Refer to the instructions in the control module documentation.

Refer to the notes for dimensioning of the cable length and cable cross-section of brake cables.

## Safety and personal protection

The permanent magnet brake of MS2E motors is no safety brake. This means, a torque reduction by non-influenceable disturbance factors can occur. Especially for use in vertical axes.

**⚠ WARNING****Grievous bodily harm due to dangerous movements from falling or dropping axes!**

Secure vertical axes against dropping or sinking after switching off by e.g.:

- Mechanical locking of the vertical axis
- External brake, arrestor, clamping device.
- Weight compensation of the axes

The holding brake itself is not suitable for personal protection. Ensure protection of persons by superordinate fail-safe measures, like block danger zones via safety fences.

For European countries, additionally comply with the following standards and guidelines, e.g.

- EN ISO 13849-1:2015 "Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)" and EN ISO 13849-2:2012 "Safety of machinery. Safety-related parts of control systems. General principles for design"
- Information sheet no. 005 "Gravity-loaded axes (vertical axes)" published by: DGV Fachbereich Holz und Metall (German Employer's Liability Insurance Association Wood and Metal)

Determine the complete safety requirements valid for the specific case of application and observe them during plant design. Comply with all applicable national regulations!

**Functionality test****⚠ WARNING****Danger of explosion at maintenance work and check operation**

Do maintenance work only outside of hazardous areas.

Ensure that no hazardous gas or dust atmosphere exists during grind in procedures.

That is why the function and the holding brakes have to be checked in regular intervals and malfunctions must be removed in an appropriate period.

The braking effect can be reduced by:

- Corrosion on friction surfaces, vapor and sediment
- Over voltages and too high temperatures
- Wear (increasing the air gap between armature and pole)

The holding brake functionality can be checked mechanically by hand or automatically by means of the software function.

**Manually check holding torque (M4)**

1. ➤ De-energize the motor and ensure it cannot be restarted.
2. ➤ Measure the transferable holding torque (M4) of the holding brake with a torque wrench.

**Check holding torque (M4) using the software function**

For Bosch Rexroth drive controller

- Start the P-0-0541, C2100 Command Holding system check in drive controller. The efficiency of the holding brake and the opened state are checked by starting the routine.

- If the holding torque (M4) **is not achieved**, the resurfacing routine can be used to reconstitute the holding torque. If you have any questions about grind in parameters, contact Bosch Rexroth service.

**6.2.9 Vibration behavior**

The oscillation behavior corresponds to oscillating quantity level A according to EN IEC 60034-14:2018 up to the rated speed.

## 6.2.10 Bearing

The motors are equipped with a deep-groove ball bearing with high-temperature grease for pre-lubrication.

Table 17: Bearing size MS2E

| Type   | Bearing size DE | Bearing size NDE | Floating bearing | Fixed bearing |
|--------|-----------------|------------------|------------------|---------------|
| MS2E03 | 6001            | 6000             | DE               | NDE           |
| MS2E04 | 6003            | 6001             | DE               | NDE           |
| MS2E05 | 6204            | 6303             | DE               | NDE           |
| MS2E06 | 6206            | 6303             | DE               | NDE           |
| MS2E07 | 6207            | 6205             | DE               | NDE           |
| MS2E10 | 6308            | 6306             | DE               | NDE           |

### Bearing service life

The bearing lifetime is an important criterion for the availability of motors. The operating conditions influence the bearing service life  $L_{10h}$  considerably.

The following boundary conditions apply to the bearing service life  $L_{10h}$ :

- Operation within the specified permissible loads (radial and axial force)
- Operation within the permissible ambient conditions (temperature range 0 ... 40 °C, vibration, and so on)
- Operation within the thermally permissible operating characteristic curve

The bearing lifetime also depends on the service life of the grease. A calculated grease service life was used for the mentioned specifications, taking into consideration the following boundary conditions.

- Horizontal installation
- Low vibration and impact loads
- No oscillating bearing movement < 180°
- Mean speed  $\rightarrow$  Table 18 "Mean speed - basis of calculated grease service life" on page 41

Table 18: Mean speed - basis of calculated grease service life

| Type                  | Mean speed        |
|-----------------------|-------------------|
| MS2E03, -04, -05, -06 | $\leq 3500$ 1/min |
| MS2E07                | $\leq 3000$ 1/min |
| MS2E10                | $\leq 2000$ 1/min |

The following standard values apply under the specified preconditions:

$L_{10h} = 30.000$  h, in case of utilization after S1-60K and max. load factor 95% during the runtime.

⚠ When exceeding or not complying with these conditions, a reduced service life is to be expected.:

### Explanation of radial and axial force

During operation, both radial and axial forces act upon the motor shaft and the motor bearing. The permissible radial force  $F_R$  in distance  $x$  from the shaft shoulder and the mean speed is specified in the radial force diagrams.

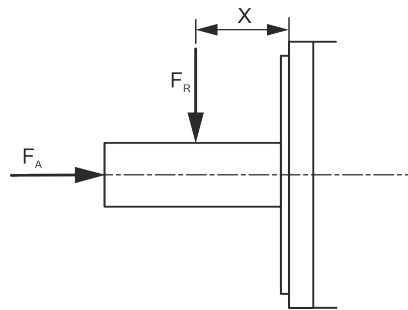


Fig. 11: Point of action of radial force  $F_R$  and axial force  $F_A$

The axial force values are the minimum permissible axial forces  $F_A$  without limitations. A detailed dimensioning is only possible if more boundary conditions are known:

- Axial and radial force with force application point
- Installation position (horizontal, vertical with the shaft end pointing to the top or bottom)
- Mean speed

**For radial force diagrams, refer to the technical data**

## 6.2.11 Frame size, installation type

The motors can be installed horizontally and vertically with the shaft end pointing to the top or bottom. The mounting variants comply with the IM code according to EN 60034-7:1993 + A1:2001 for design and installation type.

**Code I / Code II (EN 60034-7:1993 + A1:2001)**

IM B5 / IM  
3001



Flange attachment on the drive side of the flange

IM V1 / IM  
3011



Flange attachment on the drive side of the flange, drive side facing down

IM V3 / IM  
3031



Flange attachment on the drive side of the flange, drive side facing up

Avoid liquid at the drive shaft or the shaft sealing ring in case of vertical installation according to IM V3.

## 6.2.12 Coating

One-layer standard varnish (1K), waterbased, in conductive form, RAL9005 jet black, nominal thickness 40 µm

### ⚠ WARNING

**Danger of explosion due to improper change of the surface characteristics.**

An additional varnish on motors for hazardous areas is not allowed in order not to negatively influence the surface characteristics (like e.g. insulation resistance, electrostatic charging).

## 6.2.13 Noise emission

The typical sound pressure level  $L_p(A)$  is specified for the speed range 0 rpm up to the rated speed. The installation situation affects the noise emission.

# 7 Transport and storage

## 7.1 Storage

Store the motors in their original packaging in a dry, dust-free, vibration-free and light-protected place without direct solar radiation. Please observe classes 1K21, 1B1, 1C1, 1S10, 1M11 specified for storage acc. to DIN EN 60721-3-1.

Please observe the following classification limitations:

Table 19: Classification limitation  
(DIN EN IEC 60721-3-1)

### Bearing

Ambient temperature -25 ... +55 °C

Relative air humidity 5 ... 75 %

Absolute air humidity 1 ... 29 g/m³

Direct solar radiation Not permitted

Shock load

→ Chapter 7.3

“Shock load during transport und storage” on page 44

### NOTICE

#### Damage due to moisture and humidity!

- Protect the products from dampness and corrosion.
- Store them only in rainproof and dry rooms.

Additional measures have to be taken upon commissioning to ensure smooth functioning – irrespective of the storage time which may be longer than the warranty period of our products. Warranty extension is not a consequence.

Table 20: Measures before commissioning motors that have been stored over a prolonged period of time

| Storage time / months |      |      | Measures for commissioning                                                                                                                                                                                                      |
|-----------------------|------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| > 1                   | > 12 | > 60 |                                                                                                                                                                                                                                 |
|                       |      |      | <ul style="list-style-type: none"><li>• Visual inspection of all parts to be damage-free</li></ul>                                                                                                                              |
|                       |      |      | <ul style="list-style-type: none"><li>• Resurface the holding brake</li><li>• Check the electric contacts to verify that they are free from corrosion</li></ul>                                                                 |
|                       |      |      | <ul style="list-style-type: none"><li>• Let the motor run in without load for one hour at 800 ... 1000 rpm.</li><li>• Measure insulation resistance. Dry the winding at a value of &lt; 1kOhm per volt rated voltage.</li></ul> |
|                       |      |      | <ul style="list-style-type: none"><li>• Replace bearings</li><li>• Replace encoder</li></ul>                                                                                                                                    |

7.2 Transport

The motors must be transported in their original package taking classes 2K11, 2B1, 2C1, 2S5, 2M4 specified acc. to DIN EN 60721-3-2 into account.

Please observe the following classification limitations:

Table 21: Classification limitation (DIN EN IEC 60721-3-2)

| Transport           |                                                                       |
|---------------------|-----------------------------------------------------------------------|
| Ambient temperature | -25 ... +70 °C                                                        |
| Relative humidity   | 5 ... 75 %                                                            |
| Shock load          | ↪ Chapter 7.3<br>“Shock load during transport und storage” on page 44 |

Instructions on transport by air

If motor components with permanent magnets are shipped by air, the DGR (Dangerous Goods Regulations) of the IATA (International Air Transport Association) for hazardous materials of class 9 which also include magnetized substances and objects has to be complied with. This involves, for example:

- Secondary parts of synchronous linear motors
- Rotors of synchronous kit motors
- Rotors of synchronous housing motors (if these are dispatched as motor component, i.e. separate from the stator or motor housing, in service cases)

For details on the maximum allowed magnetic field strengths as well as information on measurement methods for these magnetic field strengths, please refer to the current IATA DGR (see chapter 3.9.2.2).

7.2.1 Instructions on machine transport

NOTICE

Never touch the connection points of electrostatic sensitive devices!

- Mounted components (e.g. temperature sensors, encoder) can contain parts susceptible to electrical discharge (ESD). Observe the ESD safety measures.

### ⚠ WARNING

#### Risk of injury and material damage due to improper handling during transport!

- Only use hoisting gear suited for the weight of the motors. Use lifting sling belts or lifting eye bolts. Secure the lifting eye bolts before use.  
Never walk under hanging loads.
- Do not lift the motor at the shaft or on the optional fan housing.
- Use suitable protective equipment and protective clothing during transport, and wear safety shoes.

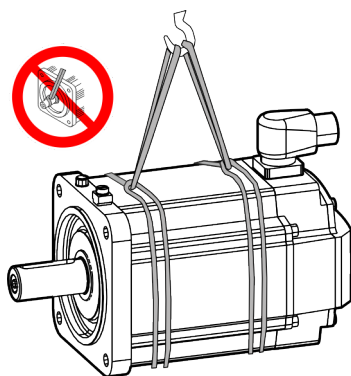


Fig. 12: Lifting and transporting motors

- Before transporting the motor, determine the weight of the motor. For more details about motor weight, please refer to the type plate or the project planning manual (Technical data).
- Adjust the carrying capacity of the lifting device to the motor weight.
- If provided by the manufacturer, all lifting eye bolts must be used and tightened before use.
- Avoid increased transport vibrations.
- Remove any existing transport locks prior to commissioning and keep them.

## 7.3 Shock load during transport and storage

Function-impairing effects are avoided as long as the specified limits are complied with.

Table 22: Permissible shock load for MS2E motors

| Frame size       | Maximum allowed shock load (11 ms) |                        |
|------------------|------------------------------------|------------------------|
|                  | Axial                              | radial                 |
| MS2E03, -04, -05 | 100 m/s <sup>2</sup>               | 1,000 m/s <sup>2</sup> |
| MS2E06           | 100 m/s <sup>2</sup>               | 500 m/s <sup>2</sup>   |
| MS2E07           | 100 m/s <sup>2</sup>               | 300 m/s <sup>2</sup>   |
| MS2E10           | 100 m/s <sup>2</sup>               | 200 m/s <sup>2</sup>   |

## 8 Assembly

### 8.1 Flange assembly

#### NOTICE

#### Motor damage due to ingress of liquids!

Liquid which exists over a longer period on the shaft sealing ring of the output shaft can ingress into the motor and cause damage.

- Ensure that liquid cannot be present at the output shaft.
- Do not mount any open gearboxes (gearboxes that are not hermetically sealed).

Use all motor mounting holes to mount the motor safely to the machine. For details on mounting holes, please refer to the dimension sheets.

- If coupling is direct, ensure that the support is plane and the orientation is precise.
- Avoid pinching or jamming the centering collar on the motor side.

- Avoid damaging the receptacle fit on the plant side.
- Use screws and washers for flange fastening → Chapter 6.2.2 “Mechanical interfaces” on page 31.

## 8.2 Assemble transmission elements

### NOTICE

#### Motor damage due to strikes onto the motor shaft

Do not strike the shaft end and do not exceed the allowed axial and radial forces of the motor.



Fit and pull off the transmission elements such as pulleys and couplings only with suitable equipment; heat them, if necessary.

- Avoid inadmissible belt tensions. Please consider the allowed radial and axial forces in the project planning manuals.
- The balancing state of transmission elements must comply with the full-key balancing of the motors.

### Fitting

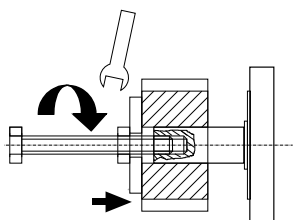


Fig. 13: Fitting the transmission element

- Use the centering hole for fitting transmission elements. For details on centering holes, please refer to the specifications.
- Heat the transmission element, if necessary.

## 8.3 Electrical connection

### 8.3.1 Electrical connection general notes

#### ⚠ WARNING

**Danger! Electric voltage! Operations in the vicinity of live parts are extremely dangerous.**

- Work required on the electric system may only be carried out by skilled electricians. Tools for electricians (VDE tools) are absolutely necessary.
  - Isolate (even auxiliary circuits).
  - Secure against reactivation.
  - Ensure de-energization.
  - Ground and short-circuit.
  - Cover or shield any adjacent live parts.

#### ⚠ WARNING

#### Risk of explosion due to improper handling during motor connection!

Make sure that the motor is only connected in de-energized state and a non-explosive atmosphere.

Before working on the system, always use a suitable measuring device (e.g. multimeter) to check whether any parts of the system are still under residual voltage (e.g. caused by residual energies of capacitors in filters and drive units etc.) their discharge times are to be waited for.

The connection between the protective conductor terminal and the operating ground must be made before any other connections.

The connection or terminal points to or on the control unit must be located outside the potentially explosive atmosphere or must be approved for use in potentially explosive atmospheres.

**⚠ WARNING**

**High electric voltage! Danger to life, risk of injury by electric shock.**

While the rotor is rotating, motors with permanent magnet excitation create a voltage > 60 V at the motor connections.

Any work may only be carried out while the motor is at standstill.

Never connect or disconnect plug connectors under load!

**NOTICE**

**Never touch the connection points of electrostatic sensitive devices!**

- Mounted components e.g. temperature sensor, encoder) can contain parts susceptible to electrical discharge (ESD).  
Observe ESD safety measures.

The electrical connection of MS2E motors consists of the following components:

- Circular connectors for power and encoder connection
- Equipotential bonding conductor (ground conductor)

Use shielded connection lines.

The protective conductor connection is made via the protective conductor routed in the ready-made power cable. An additional connector of a grounded earth conduction or a potential equalization line for Ex motors is required according to EN IEC 60079-0:2018/AC:2020 MS2E motors must be grounded via an additional connection part (protective earth terminal at the motor flange). Ground terminal cross section see ➔ [Chapter 8.3.6 "Ground connection"](#) on page 50.

Furthermore, the instructions according to EN 60079-14:2014 must be observed during electrical connection and commissioning.

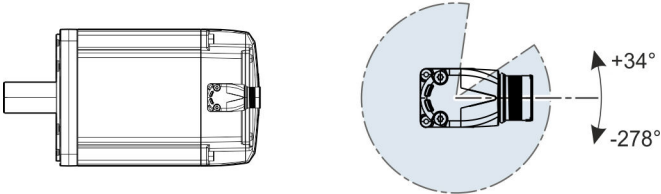
8.3.2 Overview

MS2E connection system overview

| Type            | Connection mode                                                                                       | Type of connection/size | Locking              | Output direction       |
|-----------------|-------------------------------------------------------------------------------------------------------|-------------------------|----------------------|------------------------|
| MS2Exx-xxxx-xxS |  Single cable        | M23                     | SpeedCon             | rotatable              |
| MS2Exx-xxxx-xxV |  performance Encoder | M40<br>M17              | SpeedCon<br>SpeedCon | rotatable<br>rotatable |

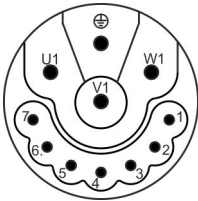
8.3.3 MS2E Electrical connection “S”

M23 view (single cable connection) / rotation range



| Device connector  | Single cable connection |
|-------------------|-------------------------|
| Connector size    | M23                     |
| Output direction  | rotatable (max. 10x)    |
| Adjustment torque | 4 ... 10 Nm             |
| Locking           | SpeedCon                |

Pin assignment pole pattern M23 (single cable connection)



|                                                                                     | Function   |               |
|-------------------------------------------------------------------------------------|------------|---------------|
|                                                                                     | Encoder Cx |               |
|                                                                                     | with brake | without brake |
| U1                                                                                  | A1         | A1            |
| V1                                                                                  | A2         | A2            |
| W1                                                                                  | A3         | A3            |
|  | PE         | PE            |
| 1                                                                                   | +UB        | +UB           |
| 2                                                                                   | GND        | GND           |
| 3                                                                                   | Data+      | Data+         |
| 4                                                                                   | Data-      | Data-         |

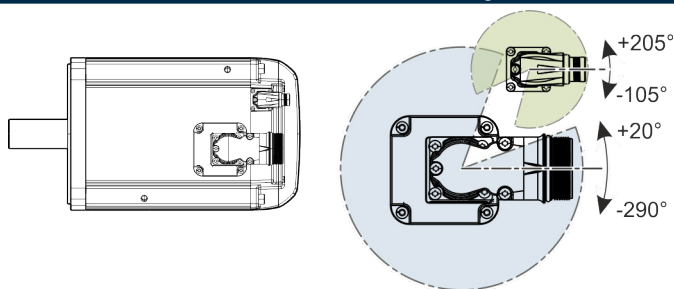
#### Pin assignment pole pattern M23 (single cable connection)

|   |       |      |
|---|-------|------|
| 5 | Shld  | Shld |
| 6 | BD(+) | n.c. |
| 7 | BD(-) | n.c. |

Note for assembly about SpeedCon connectors, see

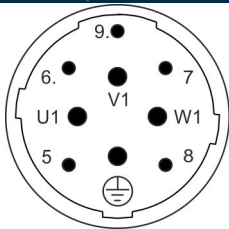
### 8.3.4 MS2E Electrical connection “V”

View M40 power, M17 encoder (double cable connection) / rotating area



| Device connector  | Performance          | Encoder    |
|-------------------|----------------------|------------|
| Connector size    | M40                  | M17        |
| Output direction  | rotatable (max. 10x) |            |
| Adjustment torque | 12 ... 18 Nm         | 2 ... 6 Nm |
| Locking           | SpeedCon             | SpeedCon   |

Pol pattern M40 power, (double cable connection)

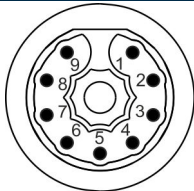


| Function                                                                          |            |               |
|-----------------------------------------------------------------------------------|------------|---------------|
| Encoder Cx, Dx                                                                    |            |               |
|                                                                                   | with brake | without brake |
| U1                                                                                | A1         | A1            |
| V1                                                                                | A2         | A2            |
| W1                                                                                | A3         | A3            |
|  | PE         | PE            |
| 5                                                                                 | n.c.       | n.c.          |
| 6                                                                                 | n.c.       | n.c.          |
| 7                                                                                 | BD(+)      | n.c.          |
| 8                                                                                 | BD(-)      | n.c.          |
| 9                                                                                 | n.c.       | n.c.          |

Note for assembly about SpeedCon connectors, see

8.3.5 MS2E Electrical connection “Encoder”

Pol pattern M17, encoder (double cable connection)

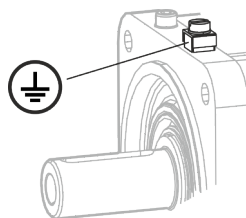


| Function |          |
|----------|----------|
| Encoder  |          |
|          | Cx<br>Dx |
| 1        | +UB      |
| 2        | n.c.     |
| 3        | Data+    |
| 4        | Data-    |
| 5        | n.c.     |
| 6        | n.c.     |
| 7        | n.c.     |
| 8        | n.c.     |
| 9        | GND      |

Note for assembly about SpeedCon connectors, see ➞ Chapter 8.3.10 “Connect flange socket” on page 53

### 8.3.6 Ground connection

Motors for hazardous areas must be grounded via a separate ground conductor and a grounding conductor within the motor power cable. An additional connection clamp is provided on the motor flange to connect the grounding conductor.



|                       |                                                                     |
|-----------------------|---------------------------------------------------------------------|
| Ground connection     | Screw M5                                                            |
| Nominal cross-section | 4 mm <sup>2</sup>                                                   |
| Clamping range        | 4 mm <sup>2</sup> (fine-wired); 6 mm <sup>2</sup> (single stranded) |
| Tightening torque     | 2 Nm                                                                |

### 8.3.7 Shielding concept

Converter-fed drives can generate high-frequency discharge currents in motor cables and motors. By using shielded cables and a large-area, low-impedance connection of the shield connections at motor and controller, impedances can be minimized and the discharge currents can be lead from the motor to the controller. Ready-made cables of Bosch Rexroth are designed and tested according to the requirements of installed motor components.

For more information about Electromagnetic compatibility (EMC), refer to the project planning manual of the respective drive system.

### 8.3.8 Protective cable glands for connectors

At delivery, the connectors are locked with protective cable glands, which meet the requirements for ATEX applications. The cable gland protects the motor from humidity, dirt and mechanical damage.

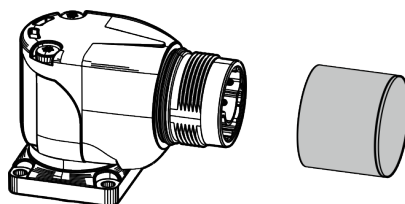


Fig. 14: Protective cable glands

Remove the protective cable glands right before connecting the mating connector. Always use protective cable glands, if no plug-connector is connected (e.g. storage, maintenance, ...).

### 8.3.9 Plug connector protective cover

The plug connector protective cover fulfills the required protection against impact onto the plug connector according to the ATEX directive. In the special conditions on use X we refer to the responsibility of the plant manufacturer to do a risk evaluation.

#### NOTICE

#### Loss of protective function! Replace a damaged connector protective cover

Immediately replace the connector protective cover after an impact to ensure the required device safety according to EN IEC 60079-0:2018/AC:2020.

Optionally, the connector protective cover can be used as disassembly protection. It fulfills the required protection against unintended loosening the plug connector during motor operation according to the ATEX directive. The connector can be disassembled only if the protective cover is removed. Assembly tools are required to remove the protective cover. Unintended loosening of the connector under load is excluded, if the protective cover is assembled.

| Order number | Designation  | Size |
|--------------|--------------|------|
| R911404719   | SUP-M02-MS2E | M17  |

| Order number | Designation  | Size |
|--------------|--------------|------|
| R911392284   | SUP-M01-MS2E | M23  |
| R911412835   | SUP-M03-MS2E | M40  |

**Assemble connector protective cover**

To assemble the connector protective cover, prepare the fitting panel. Deviate the base (0500 A) and bend the connector protective cover in the specified order into the specified form as follows.

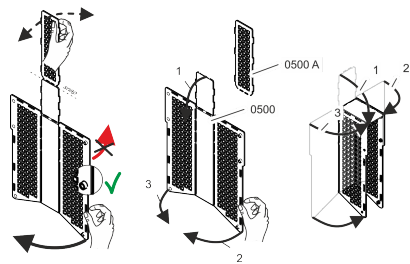


Fig. 15: Prepare connector protective cover

Position the connector protective cover over the motor connector. Observe that the output direction of the connector is adjusted to a 90° position.

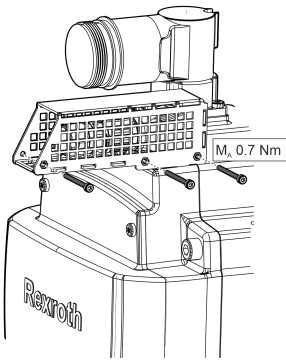
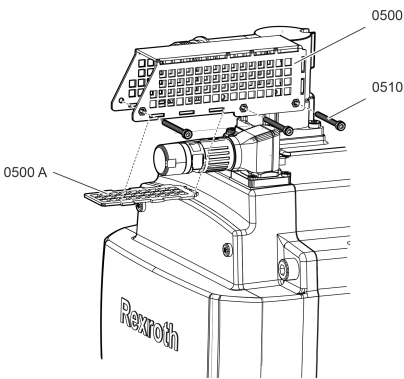


Fig. 16: Assemble plug connector protective cover M17

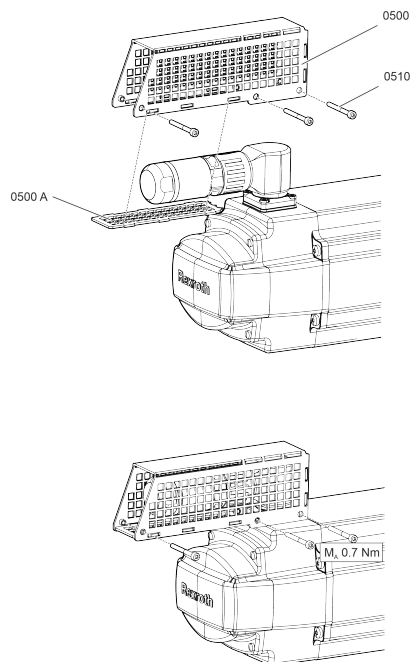


Fig. 17: Assemble plug connector protective cover M23

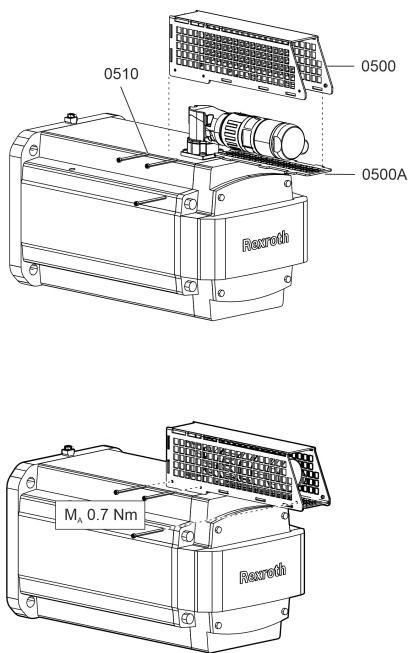


Fig. 18: Plug connector protective cover M40 assembly

The rotatable plug connector is set to a 90° position.

1. ➤ Position the connector protective cover onto the plug connector
2. ➤ Join the base (0500A) form-fitting into the grooves of the protective cover (0500).
3. ➤ Tighten (tightening torque 0.7 Nm) the fastening screws (0510)
  - ➔ The connector protective cover is ready to use.

### 8.3.10 Connect flange socket

Observe when connecting the flange socket:

- Connect or disconnect plug connections only in de-energized, dry and clean state.
- Connect the motor with the ready-made connection cable.
- Protect the connector from external force effect.
- Observe the general installation conditions.

ⓘ Please observe the special conditions on use "X" for tensile load and impact test.:

➔ Chapter 4.4 "Special conditions on use X" on page 23

### Mounting instructions for single cable connection plug-connector

Motor types: MS2Exx-xxxxN-CxSxx-NNNNN-NN

Cable types: RH2-xxxxx-NN-xxx,x

Ready-made connection cables are provided for single cable connection. Before assembly, compare the type designations of motor and cable.

- ➔ Connect the cable connector to the motor connector. Observe, the knurled nut of the cable connector in "open" position. Only in this position, the cable connector can be slid on. Avoid any kind of force.
- ➔ Tighten the knurled nut of the cable connector with a 90° turn.
- ➔ Check the firm seat of the SpeedCon quick lock by short pull on the connector.
- ➔ Secure the cable to prevent accruing forces due to cable vibrations onto the connector.

SUP-M01-MS2E plug connector protective cover is available as an optional accessory.

## 9 Commissioning and operation

### 9.1 Safety

#### ⚠ WARNING

**High electric voltage! Danger to life, risk of injury by electric shock.**

- Life parts are dangerous.  
Do not open any covers or flange sockets during operation.  
Never connect or disconnect plug connectors under load!

#### ⚠ WARNING

**Risk of injury due to rotating motor shaft!**

- Do not remove any covers, machine parts or protection devices during operation.  
Do not enter the range of movement of the machine. Avoid unintended access for persons, due to
  - Safety fences, safety screens or protective covers.
  - Optical sensors

#### ⚠ CAUTION

**Thermal danger due to hot surfaces with temperatures over 60 °C during operation**

- Do not touch hot motor surfaces.  
Install protection against contact, if necessary.  
Make sure that no temperature-sensitive components (cables, electronic components, ...) touch hot surfaces.

All persons working with motors (responsible persons, mechanics and planners) must have knowledge, skills and competence according to EN 60079-14:2014.

## 9.2 Commissioning

**Commissioning in potentially explosive atmospheres is prohibited until it has been ascertained that the overall system corresponds to the demands and certification conditions for explosion protection.**

MS2E motors can only be commissioned with other components (drive controller, control unit).

### Prior to commissioning

Make sure you have the documentations of all used products ready.

Prior to commissioning, ensure that the following requirements are met.

- Ensure that the motor and all participating components of the drive are undamaged.
- Storage time of the motor. Depending on the storage time, take measures to ensure safe operation. Run in bearings, resurface the holding brake, ... See table → Chapter 7.1 "Storage" on page 42.
- Make sure that all mechanical and electrical connections (temperature sensor, potential equalization conductor, ...) are properly connected and secured against loosening.
- Ensure that a holding brake voltage of 24 V  $\pm$  10% is applied to the motor. If necessary, adjust the voltage.
- Check the proper function of the holding brake.
- **Do not** do the grinding procedure in hazardous ambience.
- Ensure that keys are protected against ejection.

Enable the safety devices and monitoring systems of the machine.

### Commissioning

Once all requirements are met, proceed as follows:

- Commission the drive system according to the instructions of the corresponding product documentation. The respective information can be found in the functional description of the drive controllers.
- Record all measures taken in the commissioning log.

Observe the general and technology-dependent safety instructions in this documentation.

For commissioning of the controllers and control systems, additional steps may be required. The inspection of the functioning and performance of the systems is not object of these Operating Instructions; instead, it is carried out within the framework of the commissioning of the machine as a whole. Comply with the information and instructions of the machine manufacturer.

## 9.3 Ambient conditions during operation

Climatic conditions are defined in classes according to DIN EN IEC 60721. The classes are differentiated in the areas storage, transport and operation. They are based on long-term experiences and take all influencing variables into account, e.g., air temperature and air humidity.

A permanent use of the motors is possible when the specified class 3K22 according to DIN EN IEC 60721-3-3 is observed. Deviations and enhancements according to the following table must be observed.

Table 23: Ambient conditions

| Operation             |                               |
|-----------------------|-------------------------------|
| Installation altitude | 0 ... 1,000 m above sea level |
| Ambient temperature   | 0 ... +40 °C                  |
| Relative humidity     | 5 ... 95 %                    |
| Absolute humidity     | 1 ... 29 g/m <sup>3</sup>     |

9.3.1 Vibration load during operation

Vibrations are sine-wave oscillations in stationary use, which vary in their effect on the resistance of the motors depending on their intensity.

The specified limit values are valid for frequencies of 10-2000 Hz during stimulation on the motor flange. Limitations can be necessary for occurring resonances depending on the application and installation situation.

The following limit values apply according to EN 60068-2-6 for MS2E motors:

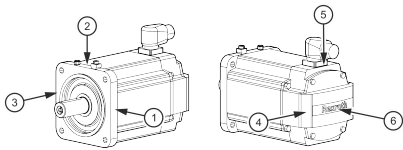


Fig. 19: Vibration load on measuring points  
Table 24: Allowed vibration load MS2E motors.

| Direction | Measuring point               | Limit value<br>(10-2000 Hz) |
|-----------|-------------------------------|-----------------------------|
|           |                               | Self-cooling                |
| radial    | 1, 2 (radial motor flange)    | 30 m/s²                     |
|           | 4, 5 (radial, bearing shield) | 50 m/s²                     |
| axial     | 3 (axial motor flange)        | 10 m/s²                     |
|           | 6 (axial bearing shield)      | 25 m/s²                     |

The specified values must not be exceeded.

9.4 Operation

During operation, keep the ambient and operation conditions and technical data specified in the operating instruction and project planning manual.

Checks during operation:

- Pay attention to exceptional noise.
- Pay attention to increased vibrations.
- Check the motor for cleanliness.
- Check the monitoring devices and diagnostic / error messages of the controllers.

**Decommission the drive when deviations from normal operation exist.** For further procedure refer to ➔ Chapter 13 “Eliminate malfunction” on page 63.

9.5 Derating in case of deviating ambient conditions.

Reduce high performance data:

- ➔ Reduce the standstill torque  $M_{0\ 60K}$ , specified in the data sheet, with the following factors.

We have:

$$M_{0\ red} = M_{0\ 60K} \times f_{TH\ 60K}$$

- ➔ Pan the S1-characteristic curve  $M_{S1}$  parallel to the speed axis to the junction of the S1-characteristic curve and to the calculated point  $M_{0\ red}$  on the torque axis.

➔ The determined characteristic curve  $M_{S1\ red}$  shows approximately the S1-characteristic curve with appropriate derating.

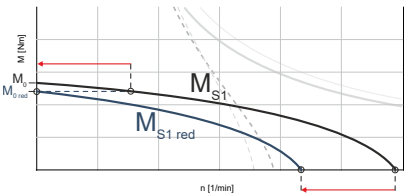


Fig. 20: Determine S1-characteristic curve  $M_{S1\ red}$  with derating factor  $f_{TH}$

Table 25: Derating factors for self-cooling 60K

| Height [m] | 40 °C | 45 °C | 50 °C | 55 °C | 60 °C |
|------------|-------|-------|-------|-------|-------|
| 1000       | 1.00  | 0.94  | 0.88  | 0.83  | 0.78  |

Derating in case of deviating ambient conditions.

| Height<br>[m] | 40 °C | 45 °C | 50 °C | 55 °C | 60 °C |
|---------------|-------|-------|-------|-------|-------|
| 1500          | 0.97  | 0.91  | 0.85  | 0.81  | 0.76  |
| 2000          | 0.94  | 0.88  | 0.83  | 0.78  | 0.73  |
| 2500          | 0.90  | 0.85  | 0.79  | 0.75  | 0.70  |
| 3000          | 0.86  | 0.81  | 0.76  | 0.71  | 0.67  |

## 9.6 Operation on foreign converters

Principally, operating MS2E motors on foreign converters is possible, but the following requirements and limitations on foreign converters must be observed.

### ▲ WARNING

#### **Danger of explosion or material damage due to overload!**

Observe the following requirements for safe motor operation on foreign converters. Connection of all necessary sensors and additional devices for a safe operation and their evaluation lies in the sole responsibility of the plant manufacturer or operator.

#### **Requirements on the power output stage**

- Converter with pulse width modulation
- Pulse frequency 4 kHz ... 16 kHz

#### **Voltage load of the motor**

During converter operation, the motor underlies a higher voltage load (insulation system, bearing) than on a sinusoidal source voltage only.

*Standard values for peak voltage and rate of rise of voltage:*

- Peak voltage  $U_{pk}$  on motor clamps  $\leq 1.56$  kV
- Rate of rise of voltage  $du/dt \leq 5$  kV/ $\mu$ s

*Maximum allowed limit load:*

In the case of critical rate of rise of off-state voltage  $du/dt \geq 5$  kV/ $\mu$ s, the limit values (peak voltage, voltage rise time) according to limit curves A according to **DIN VDE 0530-25 (VDE 0530-25):2009-08 (Figure 14 Limit curve A)** must be kept. Therefore, observe the limit values for voltage rise time and critical rate of rise of off-state voltage.

*Limit values for voltage rise time and critical rate of rise of off-state voltage:*

- Voltage rise time  $> 0.17$   $\mu$ s
- Rate of rise of off-state voltage  $du/dt < 8$  kV/ $\mu$ s

### Monitoring functions

- Speed monitoring of maximum permissible speed
- The motor load must not exceed the allowed continuous operation characteristic curve. The converter setting data for controlling and monitoring must comply with the type code data.
- Temperature control to protect from thermal overload
  - The temperature sensor of the motor winding must be connected and evaluated on the converter (ensure monitoring function, observe polarity of temperature sensor, limit switch-off temperature according to [Chapter 6.2.3 "Thermal motor protection"](#) on page 32).
  - Temperature model or I<sup>2</sup>t-monitoring within converter. Due to the coupling time of the temperature sensor, an additional suitable temperature model or an I<sup>2</sup>t-monitoring must be used.

### Switch-off

Please observe the notes in section [Chapter 4.5.6 "Switch-off"](#) on page 27.

### Requirements for motor operation with holding brake

- Ensure the brake functionality during normal operation due to voltage control, current monitoring, cyclic control of the brake holding torque, for example.
- Provide an external or an integrated protective circuit within the foreign converter to switch the holding brake (inductive load).
- Never use the holding brake of the motor as an operating brake.
- Idle time after an emergency stop before restarting  $\geq 3$  minutes.

### General notes

- The motors must be grounded via a motor cable and via a second separate ground conductor with minimum **4 mm<sup>2</sup>** cross section. Check that the position of the grounded conductor is fixed before commissioning.
- Use cables with a thermal stability of at least 80°C (176°F).
- Plug connector: Never connect or disconnect plug connectors under load!
- Connect and operate MS2E motors only with origin connection accessories. Use ready-made cables by Bosch Rexroth or with origin connectors ready-made connection cables. In the case of self-assembled cables, observe the notes about tensile load in the section “Special conditions “X”” in chapter → Chapter 4.4 “Special conditions on use X” on page 23.

#### ⚠ WARNING

#### **Danger of explosion due to exalted tensile load of connection cables**

Adherence of specified limits.

Mechanical fastening of cable ends (e.g. use cable clamps, ...).

- The plant manufacturer and operator is responsible for test and documentation of the tensile load.
- Observe the limit values for bearing load. If necessary, change the bearing according to → Chapter “Bearing service life” on page 41.

After maintenance and repair work, Bosch Rexroth always recommends to do a safety and functionality test on basis of the risk analysis provided by the customer (e.g. for thermal protection, holding brake).

## 10 Maintenance

### 10.1 Cleaning and servicing

#### ⚠ WARNING

**Operations in the vicinity of live parts are extremely dangerous.**

- Work required on the electric system may only be carried out by skilled electricians. Tools for electricians (VDE tools) are absolutely necessary.
  - Isolate (even auxiliary circuits).
  - Secure against reactivation.
  - Ensure de-energization.
  - Ground and short-circuit.
  - Cover or shield any adjacent live parts.

#### ⚠ WARNING

**Personal and material damage during maintenance work in operation!**

- Never carry out maintenance work on running machines. While carrying out maintenance work, secure the machine such that it cannot restart or be used by unauthorized persons.

#### ⚠ CAUTION

**Hot surfaces with temperatures over 60 °C may cause burns!**

- Allow the motors to cool down prior to commencing work. Wear safety gloves. Do not work on hot surfaces.

### Motors

Dirt, dust or chips may adversely affect the functionality of the motors and, in extreme cases, even cause a failure of the motors. Therefore, at regular intervals (after one year at the latest), you should clean the surface of the motors in order to achieve a sufficiently large heat radiation surface.

If the cooling fins are partially covered with dirt, sufficient heat dissipation via the ambient air is no longer possible.

Insufficient heat dissipation can have undesirable consequences. The bearing life is reduced by operation at inadmissibly high temperatures (bearing grease decomposes). Overtemperature switch-off despite operation on the basis of selected data, because the appropriate cooling is missing.



Clean the motor with a moist cloth to avoid electrostatic charge only. Rubbing with non-conductive materials must be avoided to prevent electrostatic charges resulting in ignition hazards.

## Connection cables

### ⚠ WARNING

#### Electric shock due to contact with live parts!

- Change damaged connection cables and decommission the plant immediately.  
Do not repair any connection lines provisionally.
- Check the connection cable for damage at regular intervals and replace it if necessary.
- Check optionally existing drag chains on defects.
- Check the protective conductor connection at regular intervals for proper condition and tight fit and replace if necessary.

## 10.2 Service repair, maintenance and spare parts

Wearing parts are reliably and professionally repaired and replaced by the Rexroth Service in shopfloor-oriented quality.

MS2E may only be repaired in the manufacturer's works or in a workshop authorized by Rexroth. The following repairs, for example, can be carried out in authorized workshops:

- Replace motor encoder
- Replace shaft sealing ring
- ...

The service lives of motor components, such as seals and bearings, may vary depending on the operating conditions, such as operation mode, speed, vibration and shock load, and frequent reverse mode. We recommend to change the bearing after 30,000 operating hours. Shorter replacement intervals may be necessary; cf. checks during operation. We recommend regular visual inspections on shaft sealing rings. Depending on operating conditions, signs of wear may appear after 5,000 operating hours. If necessary, replace the shaft sealing rings.

The Bosch Rexroth service helpdesk at our headquarters in Lohr, Germany and our worldwide service provide You can contact us **24/7**.

Telephone: **+49 (0) 9352 40 50 60**

Fax: **+49 (0) 9352 18 49 41**

Email: [service.svc@boschrexroth.de](mailto:service.svc@boschrexroth.de)

Internet: <https://www.boschrexroth.com>

## Preparing information

For quick and efficient help, please have the following information ready:

- Detailed description of the fault and the circumstances
- Information on the rating plate of the products in question, particularly type codes and serial numbers
- Your contact data (phone number, fax number, email address)

# 11 Disassembly and exchange

## 11.1 Tools required

### NOTICE

#### Motor damage due to strikes onto the motor shaft

- Do not strike the shaft end and do not exceed the allowed axial and radial forces of the motor.



Use suitable tools when disassembling transmission elements.

### Pulling off

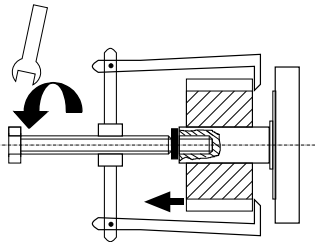


Fig. 21: Remove transmission element

Use tools suitable for pulling off. Use a shim to protect the shaft end when using pulling-off tools. Heat the output element, if necessary.

## 11.2 Replace the motor

### ⚠ WARNING

#### Electric shock due to live parts with more than 50 V!

Replacement may only be performed by personnel trained and qualified to work on or with electrical equipment.

⚠ The motor should be replaced by a motor of identical type. This is the only way to ensure that all parameterizations can remain unchanged. :

- ➔ If necessary, note the previous absolute value
- ➔ Open the main switch
- ➔ Make sure the main switch cannot be switched back on
- ➔ Disconnection plug connections
  - ⚠ When exchanging the motor, close open plug sides of power connections with protection caps if moistening with coolant/lubricant or soiling must be expected (allowed soiling degree 2 according to EN 50178):.
- ➔ Replace the motor
  - ⚠ Observe the machine manufacturer's instructions when exchanging the motor mechanically:.
- ➔ Re-establish the plug connections
- ➔ Re-establish the dimensional reference

### ⚠ WARNING

#### Risk of accidents

**due to unintentional axis movements!** : If servo axes are provided with an indirect position measuring system via the motor encoder, the dimensional reference is lost after motor replacement!

Restore dimensional reference to the machine coordinate system after replacing the motor.

## 11.3 Preparing storage

Before storing motors, the protective covers attached to the motor at the time of delivery must be attached to connectors on the shaft.

## 12 Environmental protection and disposal

Disposal of the motor components can be done according to the applicable legal process in normal recycling process.

### Recycling

Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual assemblies. Metals contained in electric and electronic assemblies can also be recycled by means of special separation processes.

### Basic components

Basically, our motors consist of the following components:

- Steel, stainless steel, aluminum, copper, brass
- Plastic parts, insulation and composite material
- Electronic components
- Permanent magnets

Plastic parts of the products may contain flame retardants. These plastic parts are labeled according to EN ISO 1043-1:2011 + A1:2016. They have to be recycled separately or disposed of according to the applicable legal provisions.

### Magnets

#### ▲ WARNING

#### Danger due to permanent magnets!

- Health hazard for persons with heart pace-makers, metallic implants and hearing aids in direct environment of permanent magnets.
- Crushing hazard of fingers and hand due to heavy attractive forces of the magnets.
- Risk of destruction of sensitive parts like watches, credit cards, ...

⚠ Remark: The permanent magnets of the rotor or secondary part must be demagnetized before disposal to avoid injuries or damage.

The demagnetization is reached via special thermal treatment. The handling duration is influenced by the rotor frame size. The rotor or the secondary part has to remain in the oven for a minimum of 30 minutes, starting at the time, the magnetic surface has reached 300 °C. If the magnets are surrounded by a bandage or a cover plate, it is recommended to remove it before heating in the oven to expose the magnets.

If demagnetization is successful, the magnets can be separated from the rotor or secondary part after cooling without applying force.

### Packaging

Our packaging materials do not contain any problematic materials and can therefore be easily disposed. Packaging materials are: wood, cardboard and polystyrene.

### Batteries and accumulators



The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin. End users in the EU are legally bound to return used batteries and accumula-

tors. Outside the scope of the EU Directive 2006/66/EC, the applicable regulations must be followed. Batteries and accumulators can contain hazardous substances which can harm the environment or people's health when improperly stored or disposed of. The batteries or accumulators must be returned to the country-specific collection systems for proper disposal.

### **Disposal by the manufacturer**

Our products can be returned to us for disposal. However, this requires that the products are free from oil, grease or other dirt. The motor components must be returned in a suitable packaging (origin package if possible). In the case of a transport by air freight, please observe the dangerous goods regulations (IATA) for the secondary part.

Send the products to the following address, carriage free:

Bosch Rexroth AG  
Bgm.-Dr.-Nebel-Str. 2  
97816 Lohr a.Main, Germany

# 13 Eliminate malfunction

As a matter of principle, the instructions in the project planning and commissioning manuals must be followed in case of failures and errors. Contact the manufacturer, if necessary.

| Fault description                                                  | Cause                                                                        | Remedy                                           |
|--------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------|
| Motor does not run                                                 | Controller enable signal missing                                             | Activate controller enable signal                |
|                                                                    | Controller fault                                                             | Troubleshoot acc. to documentation of controller |
|                                                                    | Voltage supply missing                                                       | Control voltage supply                           |
|                                                                    | Brake is not released                                                        | Check the brake activation                       |
| Vibrations                                                         | Coupling elements or attachments are poorly balanced                         | Re-balance                                       |
|                                                                    | Adjustment of shaft end attachments (coupling, gearbox, ...) is insufficient | Re-align the attachments                         |
|                                                                    | Mounting screws loose                                                        | Lock screw connections acc. to specifications    |
|                                                                    | .                                                                            | .                                                |
| Running noise                                                      | Foreign bodies within the motor                                              | Stop the motor --> repair by manufacturer        |
|                                                                    | Bearing is damaged                                                           | Stop the motor --> repair by manufacturer        |
| High motor temperatures; motor temperature monitoring is activated | Operation outside the parameters                                             | Reduce load and check the dimensioning           |
|                                                                    | Heat dissipation is impaired                                                 | Clean the motor                                  |

As a matter of principle, the instructions in the project planning and commissioning manuals must be followed in case of failures and errors. Contact the manufacturer, if necessary.

# 14 Technical data

## 14.1 Technical data

Technical data and operating characteristic curves are described in the project planning manual for all motor types. Please, refer to the following documentation for relevant information.



MS2E Synchronous Servomotors, Project planning manual, DOK-MOTOR\*-MS2E\*\*\*\*\*-PRxx-xx-P

## 15 Appendix

### 15.1 EU Declaration of Conformity



**EU-Konformitätserklärung - Original**  
**EU declaration of conformity**

Dok.-Nr. / Doc. No.: DCTC-30502-002

Datum / Date: 2021-12-22

- ☐ nach Maschinenrichtlinie 2006/42/EG / in accordance with Machinery Directive 2006/42/EC
- ☐ nach Niederspannungsrichtlinie 2014/35/EU / in accordance with Low Voltage Directive 2014/35/EU
- ☒ nach EMV-Richtlinie 2014/30/EU / in accordance with EMC Directive 2014/30/EU
- ☐ nach Druckgeräte-Richtlinie 2014/68/EU / in accordance with Pressure Equipment Directive 2014/68/EU
- ☒ nach ATEX-Richtlinie 2014/34/EU / in accordance with ATEX Directive 2014/34/EU
- ☐ nach RoHS-Richtlinie 2011/65/EU / in accordance with RoHS Directive 2011/65/EU

Hiermit erklärt der Hersteller, / *The manufacturer*

Bosch Rexroth AG, Bgm.-Dr.-Nebel-Str. 2, 97816 Lohr am Main / Germany

dass die nachstehenden Produkte / *hereby declares that the products below*

Bezeichnung: 3~ PM-MOTOR

Baureihen / MS2E03-.....NN-NN      MS2E04-.....NN-NN      MS2E05-.....NN-NN

Series: MS2E06-.....NN-NN MS2E07-.....NN-NN MS2E10-.....NN-NN

© Bosch Rexroth AG 2021

Handelsbezeichnung / Trade name: Rexroth

ab Herstelldatum / from the date of manufacture: 2021-09-01

in Übereinstimmung mit oben genannte(n) Richtlinie(n) entwickelt, konstruiert und gefertigt wurden. / were developed, designed and manufactured in compliance with the above-mentioned directive(s).

Die alleinige Verantwortung für die Ausstellung dieser EU-Konformitätserklärung trägt der Hersteller. / This EU declaration of conformity is issued under the sole responsibility of the manufacturer.

Angewandte harmonisierte Normen / *Harmonized Standards applied:*

| Norm / Standard                 | Titel / Name                                                                                                                                                                                                                          | Ausgabe / Issue                |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| EN IEC 60079-0<br>(IEC 60079-0) | Explosionsgefährdete Bereiche –<br>Teil 0: Geräte – Allgemeine Anforderungen /<br>Explosive atmospheres –<br>Part 0: Equipment – General requirements                                                                                 | 2018<br>(2017)                 |
| EN IEC 60079-7<br>(IEC 60079-7) | Explosionsgefährdete Bereiche –<br>Teil 7: Geräteschutz durch erhöhte Sicherheit „s“ /<br>Explosive atmospheres –<br>Part 7: Equipment protection by increased safety „s“                                                             | 2015+A1:2018<br>(2015+A1:2017) |
| EN 60079-31<br>(IEC 60079-31)   | Explosionsgefährdete Bereiche –<br>Teil 31: Geräte-Staubexplosionsschutz durch Gehäuse „t“ /<br>Explosive atmospheres –<br>Part 31: Equipment dust ignition protection by enclosure “t”                                               | 2014<br>(2013)                 |
| EN IEC 61800-3<br>(IEC 61800-3) | Drehzahlveränderbare elektrische Antriebssysteme – Teil 3: EMV-<br>Anforderungen einschließlich spezieller Prüfverfahren /<br>Adjustable speed electrical power drive systems – Part 3: EMC requirements<br>and specific test methods | 2018<br>(2017)                 |

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Fig. 22: DCTC-30502-002\_KOE\_N\_D0\_2021-12-22 Page 1

EU-Konformitätserklärung - Original  
EU declaration of conformity

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DCTC-30502-002 : 2021-12-22

Die Motoren haben folgende Kennzeichnungen / the motors have the following markings:

① II 3G Ex ec IIB T155°C (T3) Gc X

② II 3D Ex tc IIIC T155°C Dc X

„X“ weist auf besondere Verwendungsbedingungen hin. Diese sind in der Betriebsanleitung definiert. /  
“X” indicates special conditions of use. These are defined in the instructions.

Weitere Erläuterungen / Further explanations:

Das Produkt ist ausschließlich zum Einbau in eine Maschine bestimmt.

Der bestimmungsgemäße Gebrauch des Produktes setzt die Einhaltung der Benutzungsbestimmungen und Anwendungsbedingungen, die in der Betriebsanleitung (DOK-MOTOR\*-MS2E\*NN\*\*\*\*-ITRS-xx-x) angegeben werden, durch den Nutzer voraus.

The product is intended solely for installation in a machine.

For the product to be used as intended the user must comply with the provisions of use and conditions of application laid down in the instructions (DOK-MOTOR\*-MS2E\*NN\*\*\*\*-ITRS-xx-x).

Lohr a.Main  
Ort / Place

2021-12-22  
Datum / Date

ppa.

Uwe Czychy  
Verklebung LoP2 /  
Plant Manager LoP2

i.V.

Dr. Hans-Jürgen Wehner  
Leitung Entwicklung Motoren /  
Head of Development Motors

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.  
We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.

Fig. 23: DCTC-30502-002\_KOE\_N\_D0\_2021-12-22 Page 2

## 15.2 UL / CSA



The UL/CSA conformity of MS2E motors can be found on the type plate of the motors.

MS2E motors are “UL Recognized”. Information can be found under UL file number E335445 on the website ➔ [www.ul.com](http://www.ul.com).

## 15.3 China RoHS 2



The China RoHS 2 conformity can be found on the type plate of the motors.

Information about listing: ➔ [www.boschrex-roth.com.cn/zh/cn/home\\_2/china\\_rohs2](http://www.boschrex-roth.com.cn/zh/cn/home_2/china_rohs2)

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