

# Rexroth IndraDrive Mi Distributed Servo Drive KSM02

R911339106  
Edition 01

## Operating Instructions



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| <b>Title</b>                    | Rexroth IndraDrive Mi<br>Distributed Servo Drive KSM02                                                                                                                                                                                                                                     |
| <b>Type of Documentation</b>    | Operating Instructions                                                                                                                                                                                                                                                                     |
| <b>Document Typecode</b>        | DOK-INDRV*-KSM02*****-IT01-EN-P                                                                                                                                                                                                                                                            |
| <b>Internal File Reference</b>  | RS-94d99f3f4634ccbb0a6846a5000f00a7-1-en-US-2                                                                                                                                                                                                                                              |
| <b>Purpose of Documentation</b> | This documentation provides information on the installation and operation of the described products, by persons trained and qualified to work with electrical installations.                                                                                                               |
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| D Deutsch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | USA English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | F Français                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p><b>⚠ WARNING</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>⚠ WARNING</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>⚠ WARNING</b> Gefahrbringende 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>⚠ WARNING</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>                                                                                                                                                                                                                                                                                                                                                                                              |

| <b>D</b> Deutsch                                                                                                                                                                                                                                                                               | <b>USA</b> English                                                                                                                                                                                                                                                  | <b>F</b> Français                                                                                                                                                                                                                                                                           |
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| <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>                            |
| <p><b>⚠ VORSICHT</b> Unsachgemäße Handhabung von Batterien! Verletzungsgefahr!</p> <p>Versuchen Sie nicht, leere Batterien zu reaktivieren oder aufzuladen (Explosions- und Verätzungsgefahr).</p> <p>Zerlegen oder beschädigen Sie keine Batterien. Werfen Sie Batterien nicht ins Feuer.</p> | <p><b>⚠ CAUTION</b> Improper handling of batteries! Risk of injury!</p> <p>Do not attempt to reactivate or recharge low batteries (risk of explosion and chemical burns).</p> <p>Do not dismantle or damage batteries. Do not throw batteries into open flames.</p> | <p><b>⚠ ATTENTION</b> Manipulation incorrecte de piles! Risque de blessure!</p> <p>N'essayez pas de réactiver des piles vides ou de les charger (risque d'explosion et de brûlure par acide).</p> <p>Ne désassemblez et n'endommagez pas les piles. Ne jetez pas des piles dans le feu.</p> |

| <b>E</b> Español                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>P</b> Português                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>I</b> Italiano                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p><b>⚠ ADVERTENCIA</b> ¡Peligro de muerte en caso de no observar las siguientes indicaciones de seguridad!</p> <p>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.</p> <p>Si no dispusiera de documentación en el idioma de su país, diríjase a su distribuidor competente de Rexroth.</p> <p>Solo el personal debidamente cualificado puede trabajar en componentes de accionamiento.</p> <p>Encontrará más detalles sobre las indicaciones de seguridad en el capítulo 1 de esta documentación.</p> | <p><b>⚠ ATENÇÃO</b> Perigo de vida em caso de inobservância das seguintes instruções de segurança!</p> <p>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.</p> <p>Se não tiver disponível a documentação na sua língua, dirija-se ao seu parceiro de venda responsável da Rexroth.</p> <p>Apenas pessoal qualificado pode trabalhar nos componentes de acionamento.</p> <p>Explicações mais detalhadas relativamente às instruções de segurança constam no capítulo 1 desta documentação.</p> | <p><b>⚠ AVVERTENZA</b> Pericolo di morte in caso di inosservanza delle seguenti indicazioni di sicurezza!</p> <p>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.</p> <p>Se non dovesse essere presente la documentazione nella vostra lingua, siete pregati di rivolgervi al rivenditore Rexroth competente.</p> <p>Solo personale qualificato può eseguire lavori sui componenti di comando.</p> <p>Per ulteriori spiegazioni riguardanti le indicazioni di sicurezza consultare il capitolo 1 di questa documentazione.</p> |
| <p><b>⚠ ADVERTENCIA</b> ¡Alta tensión eléctrica! ¡Peligro de muerte por descarga eléctrica!</p> <p>Active sólo los componentes de accionamiento con el conductor protector firmemente instalado.</p> <p>Desconecte la alimentación eléctrica antes de manipular los componentes de accionamiento.</p> <p>Tenga en cuenta los tiempos de descarga de los condensadores.</p>                                                                                                                                                                                                                                                                                   | <p><b>⚠ ATENÇÃO</b> Alta tensão elétrica! Perigo de vida devido a choque elétrico!</p> <p>Opere componentes de acionamento apenas com condutores de proteção instalados.</p> <p>Desligue a alimentação de tensão antes de aceder aos componentes de acionamento.</p> <p>Respeite os períodos de descarga dos condensadores.</p>                                                                                                                                                                                                                                                                                    | <p><b>⚠ AVVERTENZA</b> Alta tensione elettrica! Pericolo di morte in seguito a scosse elettriche!</p> <p>Mettere in esercizio i componenti di comando solo con conduttore di messa a terra ben installato.</p> <p>Staccare l'alimentazione prima di intervenire sui componenti di comando.</p> <p>Osservare i tempi di scarica del condensatore.</p>                                                                                                                                                                                                                                                                                        |
| <p><b>⚠ ADVERTENCIA</b> ¡Movimientos peligrosos! ¡Peligro de muerte!</p> <p>No permanezca en la zona de movimiento de las máquinas ni de sus piezas.</p> <p>Impida el acceso accidental de personas.</p> <p>Antes de acceder o introducir las manos en la zona de peligro, los accionamientos se tienen que haber parado con seguridad.</p>                                                                                                                                                                                                                                                                                                                  | <p><b>⚠ ATENÇÃO</b> Movimentos perigosos! Perigo de vida!</p> <p>Não permaneça na área de movimentação das máquinas e das peças das máquinas.</p> <p>Evite o acesso involuntário para pessoas.</p> <p>Antes de entrar ou aceder à área perigosa, imobilize os acionamentos de forma segura.</p>                                                                                                                                                                                                                                                                                                                    | <p><b>⚠ AVVERTENZA</b> Movimenti pericolosi! Pericolo di morte!</p> <p>Non sostare nelle zone di manovra delle macchine e delle loro parti.</p> <p>Impedire un accesso non autorizzato per le persone.</p> <p>Prima di accedere alla zona di pericolo, arrestare e bloccare gli azionamenti.</p>                                                                                                                                                                                                                                                                                                                                            |

| <b>E</b> Español                                                                                                                                                                                                                                                                                                                                       | <b>P</b> Português                                                                                                                                                                                                                                                                                                                     | <b>I</b> Italiano                                                                                                                                                                                                                                                                                                                                     |
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| <p><b>⚠ ADVERTENCIA</b> ¡Campos electromagnéticos/magnéticos! ¡Peligro para la salud de las personas con marcapasos, implantes metálicos o audífonos!</p> <p>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.</p> | <p><b>⚠ ATENÇÃO</b> Campos eletromagnéticos / magnéticos! Perigo de saúde para pessoas com marcapassos, implantes metálicos ou aparelhos auditivos!</p> <p>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.</p> | <p><b>⚠ AVVERTENZA</b> Campi elettromagnetici / magnetici! Pericolo per la salute delle persone portatrici di pacemaker, protesi metalliche o apparecchi acustici!</p> <p>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.</p> |
| <p><b>⚠ ATENCIÓN</b> ¡Superficies calientes (&gt; 60 °C)! ¡Peligro de quemaduras!</p> <p>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).</p>                                                                                  | <p><b>⚠ CUIDADO</b> Superfícies quentes (&gt; 60 °C)! Perigo de queimaduras!</p> <p>Evite tocar superfícies metálicas (p. ex. radiadores). Respeite o tempo de arrefecimento dos componentes de acionamento (mín. 15 minutos).</p>                                                                                                     | <p><b>⚠ ATTENZIONE</b> Superfici bollenti (&gt; 60 °C)! Pericolo di ustioni!</p> <p>Evitare il contatto con superfici metalliche (ad es. dissipatori di calore). Rispettare i tempi di raffreddamento dei componenti di comando (almeno 15 minuti).</p>                                                                                               |
| <p><b>⚠ ATENCIÓN</b> ¡Manipulación inadecuada en el transporte y montaje! ¡Peligro de lesiones!</p> <p>Utilice dispositivos de montaje y de transporte adecuados.</p> <p>Utilice herramientas adecuadas y equipo de protección personal.</p>                                                                                                           | <p><b>⚠ CUIDADO</b> Manejo incorreto no transporte e montagem! Perigo de ferimentos!</p> <p>Utilize dispositivos de montagem e de transporte adequados.</p> <p>Utilize ferramentas e equipamento de proteção individual adequados.</p>                                                                                                 | <p><b>⚠ ATTENZIONE</b> Manipolazione inappropriata durante il trasporto e il montaggio! Pericolo di lesioni!</p> <p>Utilizzare dispositivi di montaggio e trasporto adatti.</p> <p>Utilizzare attrezzi adatti ed equipaggiamento di protezione personale.</p>                                                                                         |
| <p><b>⚠ ATENCIÓN</b> ¡Manejo inadecuado de las pilas! ¡Peligro de lesiones!</p> <p>No trate de reactivar o cargar pilas descargadas (peligro de explosión y cauterización).</p> <p>No desarme ni dañe las pilas. No tire las pilas al fuego.</p>                                                                                                       | <p><b>⚠ CUIDADO</b> Manejo incorreto de baterias! Perigo de ferimentos!</p> <p>Não tente reativar nem carregar baterias vazias (perigo de explosão e de queimaduras com ácido).</p> <p>Não desmonte nem danifique as baterias. Não deite as baterias no fogo.</p>                                                                      | <p><b>⚠ ATTENZIONE</b> Utilizzo inappropriato delle batterie! Pericolo di lesioni!</p> <p>Non tentare di riattivare o ricaricare batterie scariche (pericolo di esplosione e corrosione).</p> <p>Non scomporre o danneggiare le batterie. Non gettare le batterie nel fuoco.</p>                                                                      |

| <b>S</b> Svenska                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>DK</b> Dansk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>NL</b> Nederlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <p><b>⚠ VARNING</b> Livsfara om följande säkerhetsanvisningar inte följs!</p> <p>Använd inte produkterna innan du har läst och förstått den dokumentation och de säkerhetsanvisningar som medföljer produkten, och följ alla anvisningar.</p> <p>Kontakta din Rexroth-återförsäljare om dokumentationen inte medföljer på ditt språk.</p> <p>Endast kvalificerad personal får arbeta med drivkomponenterna.</p> <p>Se kapitel 1 i denna dokumentation för närmare beskrivningar av säkerhetsanvisningarna.</p> | <p><b>⚠ ADVARSEL</b> Livsfare ved manglende overholdelse af nedenstående sikkerhedsanvisninger!</p> <p>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.</p> <p>Kontakt din Rexroth-forhandler, hvis dokumentationen ikke medfølger på dit sprog.</p> <p>Det er kun kvalificeret personale, der må arbejde på drive components.</p> <p>Nærmere forklaringer til sikkerhedsanvisningerne fremgår af kapitel 1 i denne dokumentation.</p> | <p><b>⚠ WAARSCHUWING</b> Levensgevaar bij niet-naleving van onderstaande veiligheidsinstructies!</p> <p>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.</p> <p>Mocht u niet beschikken over documenten in uw landstaal, kunt u contact opnemen met uw plaatselijke Rexroth distributiepartner.</p> <p>Uitsluitend gekwalificeerd personeel mag aan de aandrijvingscomponenten werken.</p> <p>Meer informatie over de veiligheidsinstructies vindt u in hoofdstuk 1 van deze documentatie.</p> |
| <p><b>⚠ VARNING</b> Hög elektrisk spänning! Livsfara genom elchock!</p> <p>Använd endast drivkomponenterna med fastmonterad skyddsledare.</p> <p>Koppla bort spänningsförsörjningen före arbete på drivkomponenter.</p> <p>Var medveten om kondensatorernas urladdningstid.</p>                                                                                                                                                                                                                                | <p><b>⚠ ADVARSEL</b> Elektrisk højspænding! Livsfare på grund af elektrisk stød!</p> <p>Drive components må kun benyttes med et fast installeret jordstik.</p> <p>Sørg for at koble spændingsforsyningen fra, inden du rører ved drive components.</p> <p>Overhold kondensatorernes afladningstider.</p>                                                                                                                                                                                                                                                | <p><b>⚠ WAARSCHUWING</b> Hoge elektrische spanning! Levensgevaar door elektrische schok!</p> <p>Bedien de aandrijvingscomponenten uitsluitend met vast geïnstalleerde aardleiding.</p> <p>Schakel voor toegang tot aandrijvingscomponenten de spanningsvoorziening uit.</p> <p>Neem de ontlaadtijden van condensatoren in acht.</p>                                                                                                                                                                                                                                                                             |

| S Svenska                                                                                                                                                                                                                                                                                         | DK Dansk                                                                                                                                                                                                                                                                                                | NL Nederlands                                                                                                                                                                                                                                                                                                                                         |
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| <p><b>⚠️ VARNING</b> Farliga rörelser! Livsfara!</p> <p>Uppehåll dig inte inom maskiners och maskindelarars rörelseområde.</p> <p>Förhindra att obehöriga personer får tillträde.</p> <p>Innan du börjar arbeta eller vistas inom drivsystemets riskområde måste maskinen vara stillastående.</p> | <p><b>⚠️ ADVARSEL</b> Farlige bevægelser! Livsfare!</p> <p>Du må ikke opholde dig inden for maskiners og maskindeles bevægelsesradius.</p> <p>Sørg for, at ingen personer kan få utilsigtet adgang.</p> <p>Standt drevene helt, inden du rører ved drevene eller træder ind i deres fareområde.</p>     | <p><b>⚠️ WAARSCHUWING</b> Risicovolle bewegingen! Levensgevaar!</p> <p>Houdt u niet op in het bewegingsbereik van machines en machineonderdelen.</p> <p>Voorkom dat personen onbedoeld toegang verkrijgen.</p> <p>Voor toegang tot de gevaarlijke zone moeten de aandrijvingen veilig tot stilstand gebracht zijn.</p>                                |
| <p><b>⚠️ VARNING</b> Elektromagnetiska/magnetiska fält! Hälsofara för personer med pacemaker, implantat av metall eller hörapparat!</p> <p>Det är förbjudet för ovan nämnda personer (eller kräver överläggning med läkare) att beträda områden där drivkomponenter är monterade och i drift.</p> | <p><b>⚠️ ADVARSEL</b> Elektromagnetiske/magnetiske felter! Sundhedsfare for personer med pacemakere, metalliske implantater eller høreapparater!</p> <p>For disse personer er der adgang forbudt eller kun adgang med tilladelse fra læge til de områder, hvor drive components monteres og drives.</p> | <p><b>⚠️ WAARSCHUWING</b> Elektromagnetische / magnetische velden! Gevaar voor de gezondheid van personen met pacemakers, metalen implantaten of hoorapparaten!</p> <p>Toegang tot gebieden, waarin aandrijvingscomponenten worden gemonteerd en bediend, is verboden voor voornoemde personen of uitsluitend toegestaan na overleg met een arts.</p> |
| <p><b>⚠️ OBSERVERA</b> Varma ytor (&gt; 60 °C)! Risk för brännskador!</p> <p>Undvik att vidröra metallytor (t.ex. kylelement). Var medveten om att det tar tid för drivkomponenterna att svalna (minst 15 minuter).</p>                                                                           | <p><b>⚠️ FORSIGTIG</b> Varme overflader (&gt; 60 °C)! Risiko for forbrændinger!</p> <p>Undgå at berøre metaloverflader (f.eks. køleelementer). Overhold drive components nedkølingstid (min. 15 min.).</p>                                                                                              | <p><b>⚠️ VOORZICHTIG</b> Hete oppervlakken (&gt; 60 °C)! Verbrandingsgevaar!</p> <p>Voorkom contact met metalen oppervlakken (bijv. Koellichamen). Afkoeltijd van de aandrijvingscomponenten in acht nemen (min. 15 minuten).</p>                                                                                                                     |
| <p><b>⚠️ OBSERVERA</b> Felaktig hantering vid transport och montering! Skaderisk!</p> <p>Använd passande monterings- och transportanordningar.</p> <p>Använd lämpliga verktyg och personlig skyddsutrustning.</p>                                                                                 | <p><b>⚠️ FORSIGTIG</b> Fejlhåndtering ved transport og montering! Risiko for kvæstelser!</p> <p>Benyt egnede monterings- og transportanordninger.</p> <p>Benyt egnet værktøj og personligt sikkerhedsudstyr.</p>                                                                                        | <p><b>⚠️ VOORZICHTIG</b> Onjuist gebruik bij transport en montage! Letselgevaar!</p> <p>Gebruik geschikte montage- en transportinrichtingen.</p> <p>Gebruik geschikt gereedschap en een persoonlijke veiligheidsuitrusting.</p>                                                                                                                       |
| <p><b>⚠️ OBSERVERA</b> Felaktig hantering av batterier! Skaderisk!</p> <p>Försök inte återaktivera eller ladda upp batterier (risk för explosioner och frätskador).</p> <p>Batterierna får inte tas isär eller skadas. Släng inte batterierna i elden.</p>                                        | <p><b>⚠️ FORSIGTIG</b> Fejlhåndtering af batterier! Risiko for kvæstelser!</p> <p>Forsøg ikke at genaktivere eller oplade tomme batterier (eksplosions- og ætsningsfare).</p> <p>Undlad at skille batterier ad eller at beskadige dem. Smid ikke batterier ind i åben ild.</p>                          | <p><b>⚠️ VOORZICHTIG</b> Onjuist gebruik van batterijen! Letselgevaar!</p> <p>Probeer nooit lege batterijen te reactiveren of op te laden (explosiegevaar en gevaar voor beschadiging van weefsel door cauterisatie).</p> <p>Batterijen niet demonteren of beschadigen. Nooit batterijen in het vuur werpen.</p>                                      |

| FIN Suomi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | PL Polski                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CZ Český                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p><b>VAROITUS</b> Näiden turvaohjeiden noudattamatta jättämisestä on seurauksena hengenvaara!</p> <p>Ota tuote käyttöön vasta sen jälkeen, kun olet lukenut läpi tuotteen mukana toimitetut asiakirjat ja turvallisuusohjeet, ymmärtänyt ne ja ottanut ne huomioon.</p> <p>Jos asiakirjoja ei ole saatavana omalla äidinkielelläsi, ota yhteys asianomaiseen Rexrothin myyntiedustajaan.</p> <p>Käyttölaitteiden komponenttien parissa saa työskennellä ainoastaan valtuutettu henkilöstö.</p> <p>Lisätietoa turvaohjeista löydät tämän dokumentaation luvusta 1.</p> | <p><b>OSTRZEŻENIE</b> Zagrożenie życia w razie nieprzestrzegania poniższych wskazówek bezpieczeństwa!</p> <p>Nie uruchamiać produktów przed uprzednim przeczytaniem i pełnym zrozumieniem wszystkich dokumentów dostarczonych wraz z produktem oraz wskazówek bezpieczeństwa. Należy przestrzegać wszystkich zawartych tam zaleceń.</p> <p>W przypadku braku dokumentów w Państwa języku, prosimy o skontaktowanie się z lokalnym partnerem handlowym Rexroth.</p> <p>Przy zespołach napędowych może pracować wyłącznie wykwalifikowany personel.</p> <p>Blizsze objaśnienia wskazówek bezpieczeństwa znajdują się w Rozdziale 1 niniejszej dokumentacji.</p> | <p><b>VAROVÁNÍ</b> Nebezpečí života v případě nedodržení níže uvedených bezpečnostních pokynů!</p> <p>Před uvedením výrobků do provozu si přečtěte kompletní dokumentaci a bezpečnostní pokyny dodávané s výrobkem, pochopte je a dodržujte.</p> <p>Nemáte-li k dispozici podklady ve svém jazyce, obraťte se na příslušného obchodního partnera Rexroth.</p> <p>Na komponentách pohonu smí pracovat pouze kvalifikovaný personál.</p> <p>Podrobnější vysvětlení k bezpečnostním pokynům naleznete v kapitole 1 této dokumentace.</p> |
| <p><b>VAROITUS</b> Voimakas sähköjännite! Sähköiskun aiheuttama hengenvaara!</p> <p>Käytä käyttölaitteen komponentteja ainoastaan maadoitusjohtimen ollessa kiinteästi asennettuna.</p> <p>Katkaise jännitteensyöttö ennen käyttölaitteen komponenteille suoritettavien töiden aloittamista.</p> <p>Huomioi kondensaattoreiden purkausajat.</p>                                                                                                                                                                                                                        | <p><b>OSTRZEŻENIE</b> Wysokie napięcie elektryczne! Zagrożenie życia w wyniku porażenia prądem!</p> <p>Zespoły napędu mogą być eksploatowane wyłącznie z zainstalowanym na stałe przewodem ochronnym.</p> <p>Przed uzyskaniem dostępu do podzespołów napędu należy odłączyć zasilanie elektryczne.</p> <p>Zwracać uwagę na czas rozładowania kondensatorów.</p>                                                                                                                                                                                                                                                                                               | <p><b>VAROVÁNÍ</b> Vysoké elektrické napětí! Nebezpečí života při zasažení elektrickým proudem!</p> <p>Komponenty pohonu smí být v provozu pouze s pevně nainstalovaným ochranným vodičem.</p> <p>Než začnete zasahovat do komponent pohonu, odpojte je od elektrického napájení.</p> <p>Dodržujte vybíjecí časy kondenzátorů.</p>                                                                                                                                                                                                    |
| <p><b>VAROITUS</b> Vaarallisia liikkeitä! Hengenvaara!</p> <p>Älä oleskele koneiden tai koneenosien liikealueella.</p> <p>Pidä huolta siitä, ettei muita henkilöitä pääse alueelle vahingossa.</p> <p>Pysäytä käyttölaitteet varmasti ennen vaara-alueelle koskemista tai menemistä.</p>                                                                                                                                                                                                                                                                               | <p><b>OSTRZEŻENIE</b> Niebezpieczne ruchy! Zagrożenie życia!</p> <p>Nie wolno przebywać w obszarze pracy maszyny i jej elementów.</p> <p>Nie dopuszczać osób niepowołanych do obszaru pracy maszyny.</p> <p>Przed dotknięciem urządzenia/maszyny lub zbliżeniem się do obszaru zagrożenia należy zgodnie z zasadami bezpieczeństwa wyłączyć napędy.</p>                                                                                                                                                                                                                                                                                                       | <p><b>VAROVÁNÍ</b> Nebezpečné pohyby! Nebezpečí života!</p> <p>Nezdržujte se v dosahu pohybu strojů a jejich součástí.</p> <p>Zabraňte náhodnému přístupu osob.</p> <p>Před zásahem nebo vstupem do nebezpečného prostoru bezpečně zastavte pohony.</p>                                                                                                                                                                                                                                                                               |
| <p><b>VAROITUS</b> Sähkömagneettisia/ magneettisia kenttiä! Terveystieteiden haavojen vaara henkilölle, joilla on sydämentahdistin, metallinen implantti tai kuulolaite!</p> <p>Yllä mainituilta henkilöiltä on pääsy kielletty alueelle, joilla asennetaan tai käytetään käyttölaitteen komponentteja, tai heidän on ensin saatava tähän suostumus lääkäriltään.</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>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>HUOMIO</b> Kuumia pintoja (&gt; 60 °C)! Palovammojen vaara!</p> <p>Vältä metallipintojen koskettamista (esim. jäähdytyslevyt). Noudata käyttölaitteen komponenttien jäähtymisaikoja (väh. 15 minuuttia).</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>UPOZORNĚNÍ</b> Horké povrchy (&gt; 60 °C)! Nebezpečí popálení!</p> <p>Nedotýkejte se kovových povrchů (např. chladičů těles). Dodržujte dobu ochlazení komponent pohonu (min. 15 minut).</p>                                                                                                                                                                                                                                                                                                                                    |

| <b>FIN</b> Suomi                                                                                                                                                                                                                                                              | <b>PL</b> Polski                                                                                                                                                                                                                                                                          | <b>CZ</b> Český                                                                                                                                                                                                                                              |
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| <p><b>▲HUOMIO</b> Epäasianmukainen käsittely kuljetuksen ja asennuksen yhteydessä! Loukkaantumisaara!</p> <p>Käytä soveltuvia asennus- ja kuljetuslaitteita.</p> <p>Käytä omia työkaluja ja henkilökohtaisia suojavarusteita.</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>▲UPOZORNĚNÍ</b> Nesprávné zacházení při přepravě a montáži! Nebezpečí zranění!</p> <p>Používejte vhodná montážní a dopravní zařízení.</p> <p>Používejte vhodné nářadí a osobní ochranné vybavení.</p>                                                  |
| <p><b>▲HUOMIO</b> Paristojen epäasianmukainen käsittely! Loukkaantumisaara!</p> <p>Älä yritä saada tyhjiä paristoja toimimaan tai ladata niitä uudelleen (räjähdys- ja syöpymisaara).</p> <p>Älä hajota paristoja osiin tai vaurioita niitä. Älä heitä paristoja tulleen.</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 niszczyć baterii. Nie wrzucać baterii do ognia.</p> | <p><b>▲UPOZORNĚNÍ</b> Nesprávné zacházení s bateriemi! Nebezpečí zranění!</p> <p>Nepokoušejte se znovu aktivovat nebo dobíjet prázdné baterie (nebezpečí výbuchu a poleptání).</p> <p>Nerozebírejte ani nepoškozujte baterie. Neházejte baterie do ohně.</p> |

| <b>SLO</b> Slovensko                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>SK</b> Slovenčina                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>RO</b> Română                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p><b>▲OPOZORILO</b> Življenjska nevarnost pri neupoštevanju naslednjih napotkov za varnost!</p> <p>Izdelke začnite uporabljati šele, ko v celoti preberete, razumete in upoštevate 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>▲VAROVANJE</b> Nebezpečnostvno ohrotenje života pri nedodržiavanju naslednjih varnostnih priporočil!</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>Bližšie vysvetlenia k bezpečnostným pokynom zistíte z kapitoly 1 tejto dokumentácie.</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>Numai 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>▲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>Upoštevajte čase praznjenja kondenzatorjev.</p>                                                                                                                                                                                                                             | <p><b>▲VAROVANJE</b> Vysoké elektrické napätie! Nebezpečnostvno ohrotenie 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>Rešpektujte časy vybitia kondenzátorov.</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>                                                                                                                                                                                                                                                                    |
| <p><b>▲OPOZORILO</b> Nevami premikil! Življenjska nevarnost!</p> <p>Ne zadržujte se v območju delovanja strojev.</p> <p>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 nebezpečnostvno! Nebezpečnostvno ohrotenie života!</p> <p>Nezdržujte 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 neintenționat al persoanelor în zona de lucru a mașinilor.</p> <p>Înainte de intervenția sau accesul în zona periculoasă, opriți în siguranță componentele de acționare.</p>                                                                                                                                                                                                                                                                |

| SLO Slovensko                                                                                                                                                                                                                                                                                                              | SK Slovenčina                                                                                                                                                                                                                                                                                                                                      | RO Română                                                                                                                                                                                                                                                                                                                                                       |
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| <p><b>▲ OPOZORILO</b> Elektromagnetna / magnetna polja! Nevarnost za zdravje za osebe s spodbujevalniki 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>▲ VAROVANIE</b> Elektromagnetické/ magnetické polia! Nebezpečenstvo pre zdravie osôb s kardioštimulátormi, kovovými implantátmi alebo načúvacími 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 stimuloare cardiace, implanturi metalice sau aparate auditive!</p> <p>Intrarea 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 telesii). Upošteвайте čas hlajenja 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 nameštivjo! 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 eksplozije 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 nepoškodzuje. Nehádzte batérie do ohňa.</p>                                                                           | <p><b>▲ ATENȚIE</b> Manipulare necorespunzătoare a bateriilor! Pericol de vătămare!</p> <p>Nu încercați să reactivați sau să încărcăți bateriile goale (pericol de explozie și pericol de arsuri).</p> <p>Nu dezasmblați și nu deteriorați bateriile. Nu aruncați bateriile în foc.</p>                                                                         |

| H Magyar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | BG Български                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | LV Latviski                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p><b>▲ FIGYELMEZTETÉS!</b> Az alábbi biztonsági útmutatások figyelmen kívül hagyása életveszélyes helyzethez vezethet!</p> <p>Üzembe helyezés előtt olvassa el, értelmezze, és vegye figyelembe a csomagban található dokumentumban foglaltakat és a biztonsági útmutatásokat.</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 dolgozhat.</p> <p>A biztonsági útmutatókkal kapcsolatban további magyarázatot ennek a dokumentumnak az első fejezetében találhat.</p> | <p><b>▲ ПРЕДУПРЕЖДЕНИЕ</b> Опасност за живота при неспазване на посочените подолу 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>Подробни пояснения към инструкциите за безопасност можете да видите в Глава 1 на тази документация.</p> | <p><b>▲ BRĪDINĀJUMS</b> Turpinājumā doto drošības norādījumu neievērošana var apdraudēt dzīvību!</p> <p>Sāciet lietot izstrādājumu tikai pēc tam, kad esat pilnībā izlasījuši, sapratuši un iemēruši 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> |
| <p><b>▲ FIGYELMEZTETÉS!</b> Magas elektromos feszültség! Életveszély áramütés miatt!</p> <p>A hajtás alkatrészeit csak véglegesen telepített védővezetővel üzemeltesse!</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 zemējumvadu.</p> <p>Pirms darba pie piedziņas komponentiem atslēdziet elektroapgādi.</p> <p>Nemiet vērā kondensatoru izlādes laikus.</p>                                                                                                                                                                                                                                     |

| H Magyar                                                                                                                                                                                                                                                                                                                                                                                                 | BG Български                                                                                                                                                                                                                                                                                                                         | LV Latviski                                                                                                                                                                                                                                                                                                                                               |
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| <p><b>▲ FIGYELMEZTETÉS!</b> Veszélyes mozgás! Életveszély!</p> <p>Ne tartózkodjon a gépek és a gépalkatrészek mozgási területén belül!</p> <p>Illetéktelen személyeket ne engedjen a gép közelébe!</p> <p>Mielőtt beavatkozik, vagy a veszélyes zónába belép 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 bīstamajās zonās pilnībā apstādiniet piedziņu.</p>                                                                                                      |
| <p><b>▲ FIGYELMEZTETÉS!</b> Elektromágneses / mágneses mező! Káros hatással lehet a szívritmus-szabályozó készülékkel, fémbelöltetéssel 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>▲ VIGYÁZAT!</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). Съблюдавайте времето на охлаждане на задвижващите компоненти (мин. 15 минути).</p>                                                                                                        | <p><b>▲ UZMANĪBU</b> Karstas virsmas (&gt; 60 °C)! Apdedzināšanās risks!</p> <p>Neskarities pie metāliskām virsmām (piemēram, dzesētāja). Ļaujiet piedziņas komponentiem atdzist (min. 15 minūtes).</p>                                                                                                                                                   |
| <p><b>▲ VIGYÁZAT!</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>▲ VIGYÁZAT!</b> Akkumulátorok szakszerűtlen kezelése! Sérülésveszély!</p> <p>Üres akkumulátorokat ne aktiváljon újra, illetve ne töltsön fel (robbanás- és marásveszély)!</p> <p>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 разглобявайте 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 nesabojājiēt baterijas. Nemetiet baterijas ugunī.</p>                                                                                           |

| LT Lietuviškai                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | EST Eesti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | GR 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> Alljärgnevat ohutusjuhiste eiramine on eluohtlik!</p> <p>Võtke tooted kaiku alles siis, kui olete toodetega kaasasolevad 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>Περαιτέρω 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 patekdam 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> Επικίνδυνες τάσεις! Κίνδυνος θανάτου!</p> <p>Μην στέκεστε στην περιοχή κίνησης μηχανημάτων και εξαρτημάτων.</p> <p>Αποτρέπετε 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 kuulmisseedmetega 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 προαναφερθέντα άτομα, εκτός αν τους έχει δοθεί σχετική άδεια κατόπιν συνεννόησης με γιατρό.</p>                                                                                                                                                                       |
| <p><b>⚠️ PERSPĖJIMAS</b> Karšti paviršiai (&gt; 60 °C)! Nudegimo pavojus!</p> <p>Venkite liesti metalinius paviršius (pvz., radiatorių). Išlaikykite pavaros komponentų atvėsimo 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 mahajahtumisajast (vähemalt 15 minutit).</p>                                                                                                                                                                                                                                                                                                   | <p><b>⚠️ ΠΡΟΣΟΧΗ</b> Καυτές επιφάνειες (&gt; 60 °C)! Κίνδυνος εγκαύματος!</p> <p>Αποφεύγετε την επαφή με μεταλλικές επιφάνειες (π.χ. μονάδες ψύξης). Λάβετε υπόψη το χρόνο ψύξης των στοιχείων μετάδοσης κίνησης (τουλάχιστον 15 λεπτά).</p>                                                                                                                                                                                                                                                                                                                     |

| LT Lietuviškai                                                                                                                                                                                                                                                  | EST Eesti                                                                                                                                                                                                                                                              | GR Ελληνικά                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 priemonės.</p>                             | <p><b>⚠ ETTEVAATUST</b> Asjatundmatu käsitsemine transportimisel ja montaažil! Vigastusoht!</p> <p>Kasutage sobivaid montaaži- ja transpordiseadiseid.</p> <p>Kasutage sobivaid tööriistu ja isiklikku kaitsevarustust.</p>                                            | <p><b>⚠ ΠΡΟΣΟΧΗ</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>                          |
| <p><b>⚠ PERSPĖJIMAS</b> Netinkamas darbas su baterijomis! Susižalojimo pavojus!</p> <p>Nebandykite tuščių baterijų reaktyvuoti arba įkrauti (sprogimo ir išėsdinimo pavojus).</p> <p>Neardykite ir nepažeiskite baterijų.</p> <p>Nemeskite baterijų į ugnį.</p> | <p><b>⚠ ETTEVAATUST</b> Patareide asjatundmatu käsitsemine! Vigastusoht!</p> <p>Ärge üritage kunagi tühje patareisid reaktiveerida või täis laadida (plahvatus- ja söövitusoht).</p> <p>Ärge demonteerige ega kahjustage patareisid. Ärge visake patareisid tulle.</p> | <p><b>⚠ ΠΡΟΣΟΧΗ</b> Ακατάλληλος χειρισμός μπαταριών! Κίνδυνος τραυματισμού!</p> <p>Μην επιδιώκετε να ενεργοποιήσετε ξανά ή να φορτίσετε κενές μπαταρίες (κίνδυνος έκρηξης και διάβρωσης).</p> <p>Μην διαλύετε ή καταστρέφετε τις μπαταρίες. Μην απορρίπτετε τις μπαταρίες στη φωτιά.</p> |

| CN 中文                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>⚠ 警告</b> 如果不按照下述指定的安全说明使用，将会导致人身伤害！</p> <p>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。</p> <p>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。</p> <p>只允许有资格人员对驱动器部件进行操作。</p> <p>安全说明的详细解释在本文档的第一章。</p> |
| <p><b>⚠ 警告</b> 高电压！电击导致生命危险！</p> <p>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。</p> <p>在接触驱动器部件前先将驱动器部件断电。</p> <p>确保电容放电时间。</p>                                                                       |
| <p><b>⚠ 警告</b> 危险运动！生命危险！</p> <p>保证设备的运动区域内和移动部件周围无障碍物。</p> <p>防止人员意外进入设备运动区域内。</p> <p>在接近或进入危险区域之前，确保传动设备安全停止。</p>                                                                         |
| <p><b>⚠ 警告</b> 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！</p> <p>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。</p>                                                                                           |
| <p><b>⚠ 小心</b> 热表面（大于 60 度）！灼伤风险！</p> <p>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）。</p>                                                                                                    |
| <p><b>⚠ 小心</b> 安装和运输不当导致受伤危险！当心受伤！</p> <p>使用适当的运输和安装设备。</p> <p>使用适合的工具及用适当的防护设备。</p>                                                                                                        |
| <p><b>⚠ 小心</b> 电池操作不当！受伤风险！</p> <p>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）。</p> <p>请勿拆解或损坏电池。请勿将电池投入明火中。</p>                                                                                            |

# Table of Contents

|                                                                                                 | Page      |
|-------------------------------------------------------------------------------------------------|-----------|
| <b>1 Important Notes.....</b>                                                                   | <b>15</b> |
| 1.1 Safety Instructions.....                                                                    | 15        |
| 1.1.1 General Information.....                                                                  | 15        |
| 1.1.2 Protection Against Contact With Electrical Parts and Housings.....                        | 16        |
| 1.1.3 Protection Against Dangerous Movements.....                                               | 17        |
| 1.1.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting..... | 19        |
| 1.1.5 Protection Against Contact With Hot Parts.....                                            | 19        |
| 1.1.6 Protection During Handling and Mounting.....                                              | 19        |
| 1.1.7 Battery Safety.....                                                                       | 20        |
| 1.2 Appropriate Use.....                                                                        | 20        |
| <b>2 Identification.....</b>                                                                    | <b>23</b> |
| 2.1 Type Code.....                                                                              | 23        |
| 2.2 Type Plates.....                                                                            | 24        |
| 2.2.1 Design.....                                                                               | 24        |
| 2.3 Scope of Supply.....                                                                        | 25        |
| <b>3 Ratings and Dimensions.....</b>                                                            | <b>27</b> |
| 3.1 KSM02 without Motor Holding Brake.....                                                      | 27        |
| 3.2 KSM02 with Motor Holding Brake.....                                                         | 28        |
| 3.3 Dimensions.....                                                                             | 30        |
| <b>4 Documentations.....</b>                                                                    | <b>35</b> |
| 4.1 Drive Systems, System Components.....                                                       | 35        |
| 4.2 Motors.....                                                                                 | 35        |
| 4.3 Cables.....                                                                                 | 36        |
| 4.4 Firmware.....                                                                               | 36        |
| <b>5 Instructions for Use.....</b>                                                              | <b>37</b> |
| 5.1 Handling of the Devices.....                                                                | 37        |
| 5.2 Mounting.....                                                                               | 38        |
| 5.2.1 Required Steps to Follow.....                                                             | 38        |
| Preparations.....                                                                               | 38        |
| Mounting KSM.....                                                                               | 38        |
| 5.2.2 Mechanical Interfaces.....                                                                | 38        |
| Flange Assembly.....                                                                            | 38        |
| 5.3 Installation.....                                                                           | 39        |
| 5.3.1 General Information on How to Install the Drive Controller.....                           | 39        |
| 5.3.2 Position of Connection Points.....                                                        | 40        |
| 5.3.3 Address Selector Switch .....                                                             | 40        |
| 5.3.4 Selecting Hybrid Cable for Appropriate Connection.....                                    | 42        |
| 5.3.5 X141, Safety Technology and Service Input "Release Brake".....                            | 45        |
| 5.3.6 Second Connection Point of Equipment Grounding Conductor.....                             | 46        |

# Table of Contents

|           | Page                                                                                                                    |
|-----------|-------------------------------------------------------------------------------------------------------------------------|
| 5.4       | Commissioning, Operation, Diagnostics and Maintenance..... 47                                                           |
| 5.4.1     | Notes on Commissioning..... 47                                                                                          |
|           | General Information..... 47                                                                                             |
|           | Preparation..... 47                                                                                                     |
|           | Procedure..... 48                                                                                                       |
| 5.4.2     | Notes on Operation..... 48                                                                                              |
| 5.4.3     | Diagnostic Functions..... 48                                                                                            |
|           | Diagnostic Display KSM/KMS..... 48                                                                                      |
|           | Firmware Functions..... 50                                                                                              |
| 5.4.4     | Service Functions / Troubleshooting..... 51                                                                             |
|           | Deactivating and Dismounting the Drive..... 51                                                                          |
|           | Replacing the KSM or KMS..... 52                                                                                        |
|           | Service Function "Release Holding Brake"..... 52                                                                        |
|           | Saving Parameters..... 53                                                                                               |
|           | Firmware Update..... 53                                                                                                 |
| 5.4.5     | Maintenance..... 53                                                                                                     |
|           | Maintenance of the Motor Component..... 53                                                                              |
|           | Maintenance of the Electronic System of the Drive..... 55                                                               |
| <b>6</b>  | <b>EMC Measures for Design and Installation..... 57</b>                                                                 |
| 6.1       | Rules for Design of Installations With Drive Controllers in Compliance With EMC..... 57                                 |
| 6.2       | EMC-Optimal Installation in Facility and Control Cabinet..... 58                                                        |
| 6.2.1     | General Information..... 58                                                                                             |
| 6.2.2     | Division Into Areas (Zones)..... 58                                                                                     |
| 6.2.3     | Control Cabinet Design According to Interference Areas - Exemplary Arrangements..... 59                                 |
| 6.2.4     | Design and Installation in Area A - Interference-Free Area of Control Cabinet..... 61                                   |
| 6.2.5     | Design and Installation in Area B - Interference-Susceptible Area of Control Cabinet..... 63                            |
| 6.2.6     | Design and Installation in Area C - Strongly Interference-Susceptible Area of Control Cabinet..... 63                   |
| 6.3       | Ground Connections..... 63                                                                                              |
| 6.4       | Installing Signal Lines and Signal Cables..... 64                                                                       |
| 6.5       | General Measures of Radio Interference Suppression for Relays, Contactors, Switches, Chokes and Inductive Loads..... 65 |
| <b>7</b>  | <b>Accessories..... 67</b>                                                                                              |
| <b>8</b>  | <b>Service and Support..... 69</b>                                                                                      |
| <b>9</b>  | <b>Environmental Protection and Disposal ..... 71</b>                                                                   |
| 9.1       | Environmental Protection..... 71                                                                                        |
| 9.2       | Disposal..... 71                                                                                                        |
| <b>10</b> | <b>Appendix..... 73</b>                                                                                                 |
| 10.1      | Digital Inputs and Outputs..... 73                                                                                      |
| 10.1.1    | Digital Inputs (Safety Technology "L Options")..... 73                                                                  |

Table of Contents

|                                                             | Page      |
|-------------------------------------------------------------|-----------|
| 10.1.2 Digital Outputs (Safety Technology "L Options")..... | 73        |
| <b>Index.....</b>                                           | <b>75</b> |



# 1 Important Notes

## 1.1 Safety Instructions

### 1.1.1 General Information

- Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.
- If the supplied documents contain some information you do not understand, it is absolutely necessary that you ask Rexroth for explanation before you start working at or with the components.
- If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.  
  
In terms of this Instruction Manual, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,
  - to be trained, instructed or authorized to switch electric circuits and components safely on and off, to ground them and to mark them,
  - to be trained or instructed to maintain and use adequate safety equipment,
  - to attend a course of instruction in first aid.
- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.
- If the components take the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software components or alter source codes.
- Do not mount damaged or faulty components or use them in operation.
- Only use accessories and spare parts approved by Rexroth.
- Follow the safety regulations and requirements of the country in which the electric components of the electric drive and control system are operated.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.

**Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.**

## Important Notes

## 1.1.2 Protection Against Contact With Electrical Parts and Housings



This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

### High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:  
Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

### High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.

## Important Notes

- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a minimum cross section according to the table below. With an outer conductor cross section smaller than 10 mm<sup>2</sup> (8 AWG), the alternative connection of two equipment grounding conductors is allowed, each having the same cross section as the outer conductors.

| Cross section outer conductor | Minimum cross section equipment grounding conductor<br>Leakage current $\geq 3.5$ mA |                                  |
|-------------------------------|--------------------------------------------------------------------------------------|----------------------------------|
|                               | 1 equipment grounding conductor                                                      | 2 equipment grounding conductors |
| 1,5 mm <sup>2</sup> (AWG 16)  | 10 mm <sup>2</sup> (AWG 8)                                                           | 2 × 1,5 mm <sup>2</sup> (AWG 16) |
| 2,5 mm <sup>2</sup> (AWG 14)  |                                                                                      | 2 × 2,5 mm <sup>2</sup> (AWG 14) |
| 4 mm <sup>2</sup> (AWG 12)    |                                                                                      | 2 × 4 mm <sup>2</sup> (AWG 12)   |
| 6 mm <sup>2</sup> (AWG 10)    |                                                                                      | 2 × 6 mm <sup>2</sup> (AWG 10)   |
| 10 mm <sup>2</sup> (AWG 8)    |                                                                                      | -                                |
| 16 mm <sup>2</sup> (AWG 6)    | 16 mm <sup>2</sup> (AWG 6)                                                           | -                                |
| 25 mm <sup>2</sup> (AWG 4)    |                                                                                      | -                                |
| 35 mm <sup>2</sup> (AWG 2)    |                                                                                      | -                                |
| 50 mm <sup>2</sup> (AWG 1/0)  | 25 mm <sup>2</sup> (AWG 4)                                                           | -                                |
| 70 mm <sup>2</sup> (AWG 2/0)  | 35 mm <sup>2</sup> (AWG 2)                                                           | -                                |
| ...                           | ...                                                                                  | ...                              |

Fig. 1-1: Minimum Cross Section of the Equipment Grounding Connection

### 1.1.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors and encoders
- Defective components
- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the electric drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

## Important Notes

**Dangerous movements! Danger to life, risk of injury, serious injury or property damage!**

A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the electric drive and control system are installed.

As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

**To avoid accidents, injury and/or property damage:**

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
  - Safety fences
  - Safety guards
  - Protective coverings
  - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stopping switches in the immediate reach of the operator. Before commissioning, verify that the emergency stopping equipment works. Do not operate the machine if the emergency stopping switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of OFF switches/OFF buttons or use a safe starting lockout.
- Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
  - mechanically securing the vertical axes,
  - adding an external braking/arrester/clamping mechanism or
  - ensuring sufficient counterbalancing of the vertical axes.
- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety!**
- Disconnect electrical power to the components of the electric drive and control system using the master switch and secure them from reconnection ("lock out") for:
  - Maintenance and repair work
  - Cleaning of equipment
  - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near components of the electric drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, at initial commissioning of the electric drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of

normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

### 1.1.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

**Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!**

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
  - Areas in which components of the electric drive and control systems are mounted, commissioned and operated.
  - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs so greatly that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

### 1.1.5 Protection Against Contact With Hot Parts

**Hot surfaces of components of the electric drive and control system. Risk of burns!**

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C** (140 °F) during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficient period of time. Cooling down can require **up to 140 minutes!** The time required for cooling down is approximately five times the thermal time constant specified in the technical data.
- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, and in accordance with the respective safety regulations, the manufacturer of the machine or installation must take measures to avoid injuries caused by burns in the final application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

### 1.1.6 Protection During Handling and Mounting

**Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!**

## Important Notes

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of falling!

### 1.1.7 Battery Safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

#### **Risk of injury by improper handling!**

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.



Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

## 1.2 Appropriate Use

This product may only be used for the applications mentioned in the additional documentations (see index entry "Additional documentations") and under the described application, ambient and operating conditions.

This product is exclusively intended for use in machines and systems in an industrial environment. This is to be understood as applications according to IEC 60204-1 "Safety of machinery, Electric equipment of machines" and NFPA 79 "Electrical Standard for Industrial Machinery".

## Important Notes



Components of the Rexroth IndraDrive Mi system are **products of category C3** (with limited availability) according to IEC 61800-3. To ensure that this category (limit values) is maintained, suitable line filters must be used in the drive system.

These components are not provided for use in a public low-voltage network supplying residential areas with power. If these components are used in such a public network, high-frequency interference is to be expected. This can require additional measures of radio interference suppression.

---



## 2 Identification

### 2.1 Type Code

| Abbrev.<br>column | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
|-------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Example:          | K | S | M | 0 | 2 | . | 1 | B | - | 0  | 6  | 1  | C  | -  | 3  | 5  | N  | -  | M  | 1  | -  | H  | P  | 0  | -  | E  | T  | -  | N  | N  | -  | D  | 7  | -  | N  | N  | -  | F  | W  | .  |

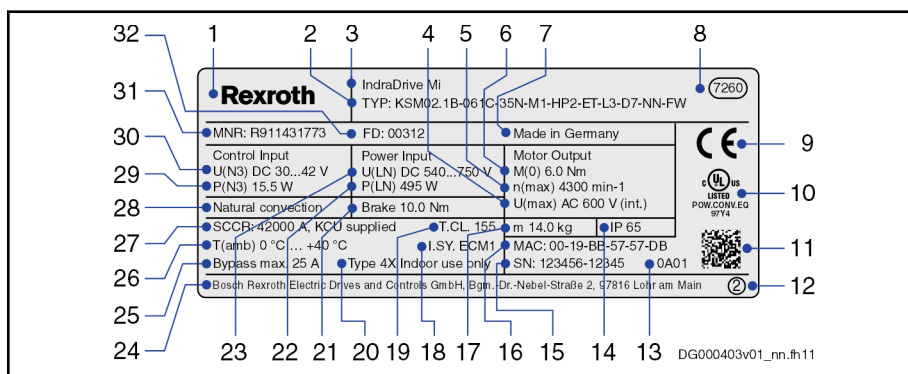
DT000074v01\_en.FH11

Fig. 2-1: Type Code KSM02

## Identification

## 2.2 Type Plates

## 2.2.1 Design



- 1 Trademark
- 2 Type designation
- 3 Product range
- 4 Max. supply voltage
- 5 Maximum speed
- 6 Continuous torque at standstill
- 7 Country of manufacture
- 8 Manufacturing plant
- 9 CE conformity label
- 10 UL label
- 11 2-D bar code
- 12 Manufacturer code
- 13 Hardware revision index
- 14 Degree of protection in accordance with IEC 60529
- 15 Serial number
- 16 MAC address (Ethernet ID)
- 17 Mass
- 18 Insulation system
- 19 Insulation class according to EN 60085
- 20 Ambient conditions according to UL50/50E
- 21 Holding brake torque (optional)
- 22 Rated power ( $t > 10$  min)
- 23 Rated input voltage, power (UL)
- 24 Company address
- 25 Maximum bypass current (UL)
- 26 Ambient temperature during operation
- 27 Short circuit current rating (UL); SCCR
- 28 Cooling type
- 29 Rated power consumption control voltage input at  $U_{N3}$  (UL)
- 30 Rated control voltage input (UL)
- 31 Parts number
- 32 Production date

Fig.2-2: Type Plate KSM02

## 2.3 Scope of Supply

| Standard                                                                                                                                                                                 | Optional                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• KSM02</li> </ul> or <ul style="list-style-type: none"> <li>• KMS02</li> </ul> <ul style="list-style-type: none"> <li>• Documentation</li> </ul> | <ul style="list-style-type: none"> <li>• <b>RBS0023</b><br/>Connector for safety zone user</li> <li>• <b>RKB0033</b><br/>Safety technology cable (X141 ↔ external safety unit)</li> <li>• <b>RKB0043</b><br/>Cable for communication (M12-D ↔ M12-D)</li> <li>• <b>RKB0044</b><br/>Cable for communication (M12-D ↔ RJ-45)</li> <li>• <b>RKS0010</b><br/>Interface cable (M12-A ↔ open ends)</li> <li>• <b>HAS10</b><br/>Fixing clip for hybrid cables</li> </ul> |

Fig.2-3: Scope of Supply



Last modification: 2012-03-27

[illegible]

- 1) Plus dissipation of braking resistor and control section
  - 2) Observe supply voltage for motor holding brakes
  - 3) HMS, HMD, HCS plus motor holding brake and control section;  
HCS01 including control section
  - 4) DC bus L+, L-; mains input L1, L2, L3
- Fig.3-1: KSM - UL Ratings and Dimensions*



A distributed servo drive KSM02 may only be operated in conjunction with an electronic control system KCU02.

| Description                                                                                         | Symbol                 | Unit | KSM02.1<br>B-041C-<br>42N-__-<br>__2 | KSM02.1<br>B-061C-<br>35N-__-<br>__2 | KSM02.1<br>B-061C-<br>61N-__-<br>__2 | KSM02.1<br>B-071C-<br>24N-__-<br>__2 | KSM02.1<br>B-071C-<br>35N-__-<br>__2 | KSM02.1<br>B-076C-<br>35N-__-<br>__2 |
|-----------------------------------------------------------------------------------------------------|------------------------|------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Listing according to UL standard (UL)                                                               |                        | -    | tbd                                  |                                      |                                      |                                      |                                      |                                      |
| Listing according to CSA standard (UL)                                                              |                        | -    | tbd                                  |                                      |                                      |                                      |                                      |                                      |
| UL files (UL)                                                                                       |                        |      | tbd                                  |                                      |                                      |                                      |                                      |                                      |
| Ambient temperature range for operation with nominal data                                           | T <sub>a,work</sub>    | °C   | 0...40                               |                                      |                                      |                                      |                                      |                                      |
| Degree of protection in accordance with IEC 60529                                                   | IP                     |      | IP 65                                |                                      |                                      |                                      |                                      |                                      |
| Ambient conditions according to UL50/50E                                                            |                        |      | tbd                                  |                                      |                                      |                                      |                                      |                                      |
| Mass                                                                                                | m <sub>mot</sub>       | kg   | 5,9                                  | 10,1                                 |                                      | 15,2                                 |                                      | 15,7                                 |
| Power dissipation at continuous current and continuous DC bus power respectively (UL) <sup>1)</sup> | P <sub>Diss_cont</sub> | W    | 70                                   | 140                                  |                                      | 175                                  |                                      | 165                                  |
| <b>Data control voltage</b>                                                                         |                        |      |                                      |                                      |                                      |                                      |                                      |                                      |
| Rated control voltage input (UL) <sup>2)</sup>                                                      | U <sub>N3</sub>        | V    | 30...42                              |                                      |                                      |                                      |                                      |                                      |
| Rated power consumption control voltage input at U <sub>N3</sub> (UL) <sup>3)</sup>                 | P <sub>N3</sub>        | W    | 29,5                                 | 35,5                                 |                                      | 41,5                                 |                                      |                                      |
| Last modification: 2012-03-27                                                                       |                        |      |                                      |                                      |                                      |                                      |                                      |                                      |

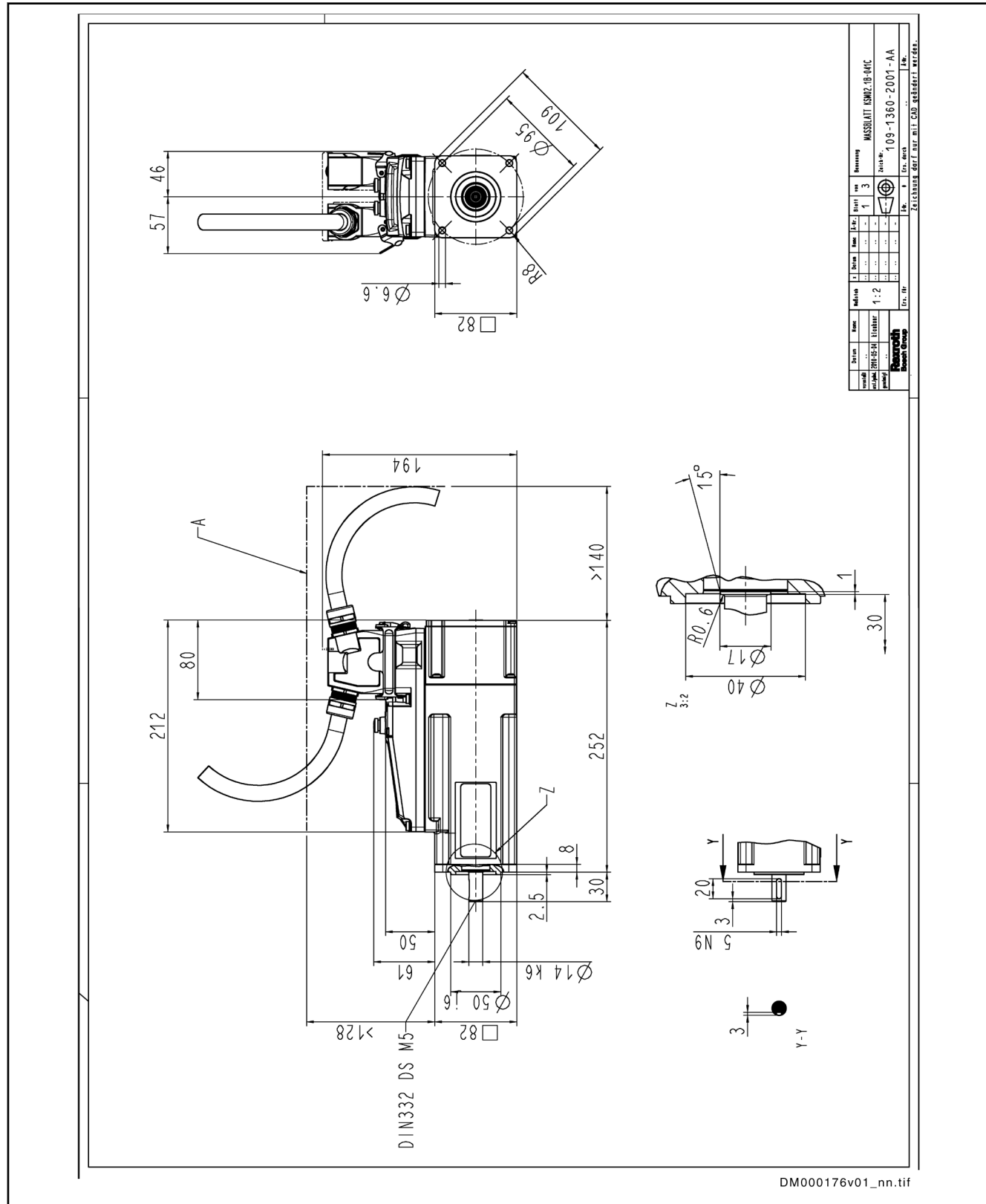
Ratings and Dimensions

| Description                                   | Symbol                | Unit              | KSM02.1<br>B-041C-<br>42N-__-<br>__2 | KSM02.1<br>B-061C-<br>35N-__-<br>__2 | KSM02.1<br>B-061C-<br>61N-__-<br>__2 | KSM02.1<br>B-071C-<br>24N-__-<br>__2 | KSM02.1<br>B-071C-<br>35N-__-<br>__2 | KSM02.1<br>B-076C-<br>35N-__-<br>__2 |
|-----------------------------------------------|-----------------------|-------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Data power section                            |                       |                   |                                      |                                      |                                      |                                      |                                      |                                      |
| Short circuit current rating (UL)             | SCCR                  | A <sub>rms</sub>  | tbd                                  |                                      |                                      |                                      |                                      |                                      |
| Maximum bypass current (UL)                   |                       | A                 | 25,0                                 |                                      |                                      |                                      |                                      |                                      |
| Rated power (t > 10 min)                      | P <sub>LN_nenn</sub>  | W                 | 470,0                                | 895,0                                | 765,0                                | 1320,0                               | 1285,0                               | 1200,0                               |
| Rated input voltage, power (UL) <sup>4)</sup> | U <sub>LN_nenn</sub>  | V DC              | 540...750                            |                                      |                                      |                                      |                                      |                                      |
| Data motor stage                              |                       |                   |                                      |                                      |                                      |                                      |                                      |                                      |
| Continuous torque at standstill<br>60 K       | M <sub>0_60</sub>     | Nm                | 2,2                                  | 6,0                                  | 5,5                                  | 10,5                                 | 10,0                                 | 8,7                                  |
| Maximum torque                                | M <sub>max</sub>      | Nm                | 9,4                                  | 25,0                                 | 18,0                                 | 35,0                                 | 28,0                                 | 29,0                                 |
| Maximum current                               | I <sub>max(rms)</sub> | A                 | 6,8                                  | 14,9                                 | 17,7                                 |                                      |                                      |                                      |
| Torque constant at 20 °C                      | K <sub>M_N</sub>      | Nm/A              | 1,60                                 | 2,03                                 | 1,16                                 | 2,52                                 | 1,85                                 |                                      |
| Maximum speed                                 | n <sub>max</sub>      | min <sup>-1</sup> | 5500                                 | 4300                                 | 6000                                 | 3400                                 | 4700                                 |                                      |
| Thermal class according to DIN<br>EN 60034-1  | I.CL.                 |                   | 155                                  |                                      |                                      |                                      |                                      |                                      |
| Last modification: 2012-03-27                 |                       |                   |                                      |                                      |                                      |                                      |                                      |                                      |

- 1) Plus dissipation of braking resistor and control section  
2) Observe supply voltage for motor holding brakes  
3) HMS, HMD, HCS plus motor holding brake and control section;  
HCS01 including control section  
4) DC bus L+, L-; mains input L1, L2, L3  
*Fig.3-2: KSM - UL Ratings and Dimensions*

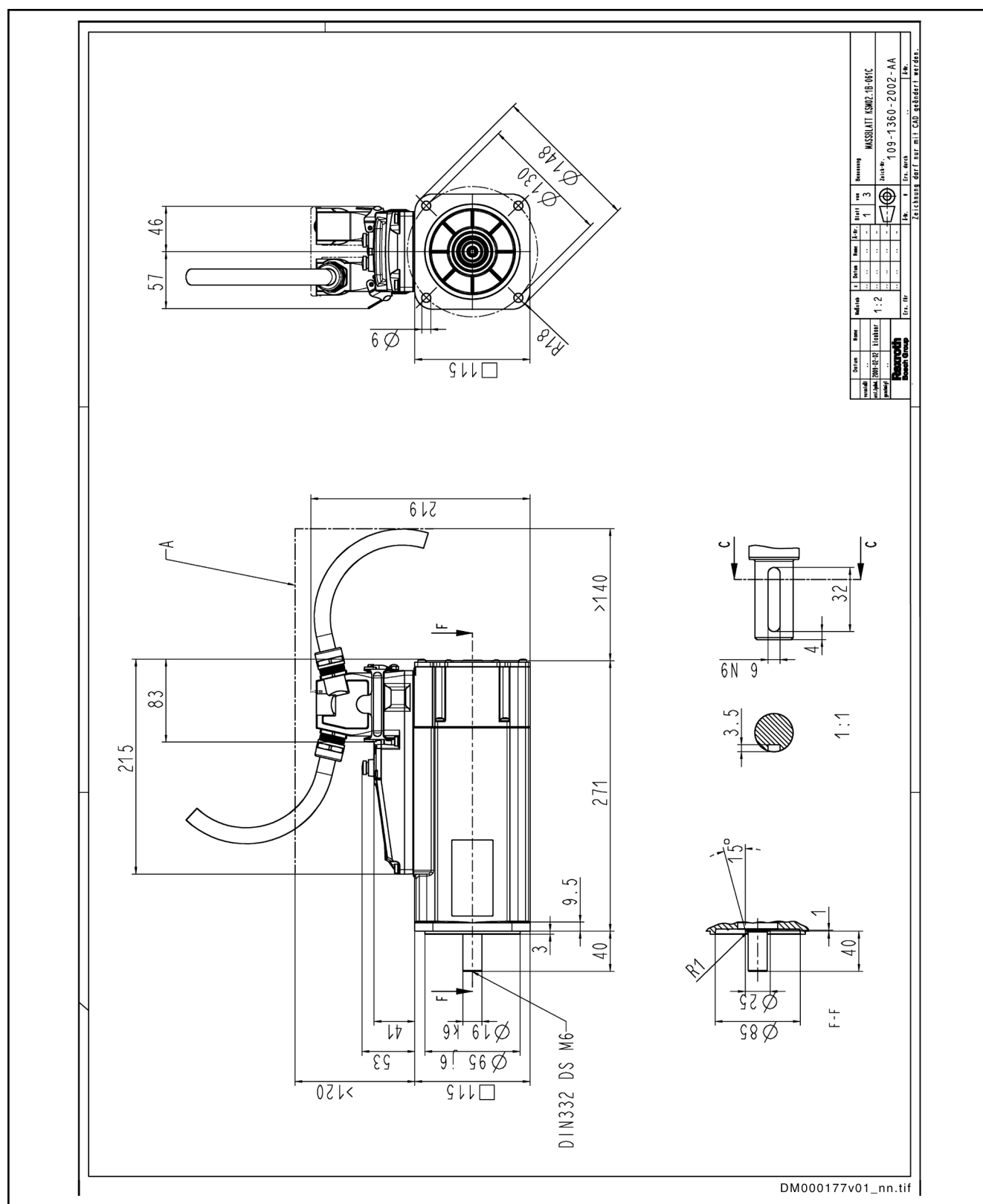
## Ratings and Dimensions

### 3.3 Dimensions



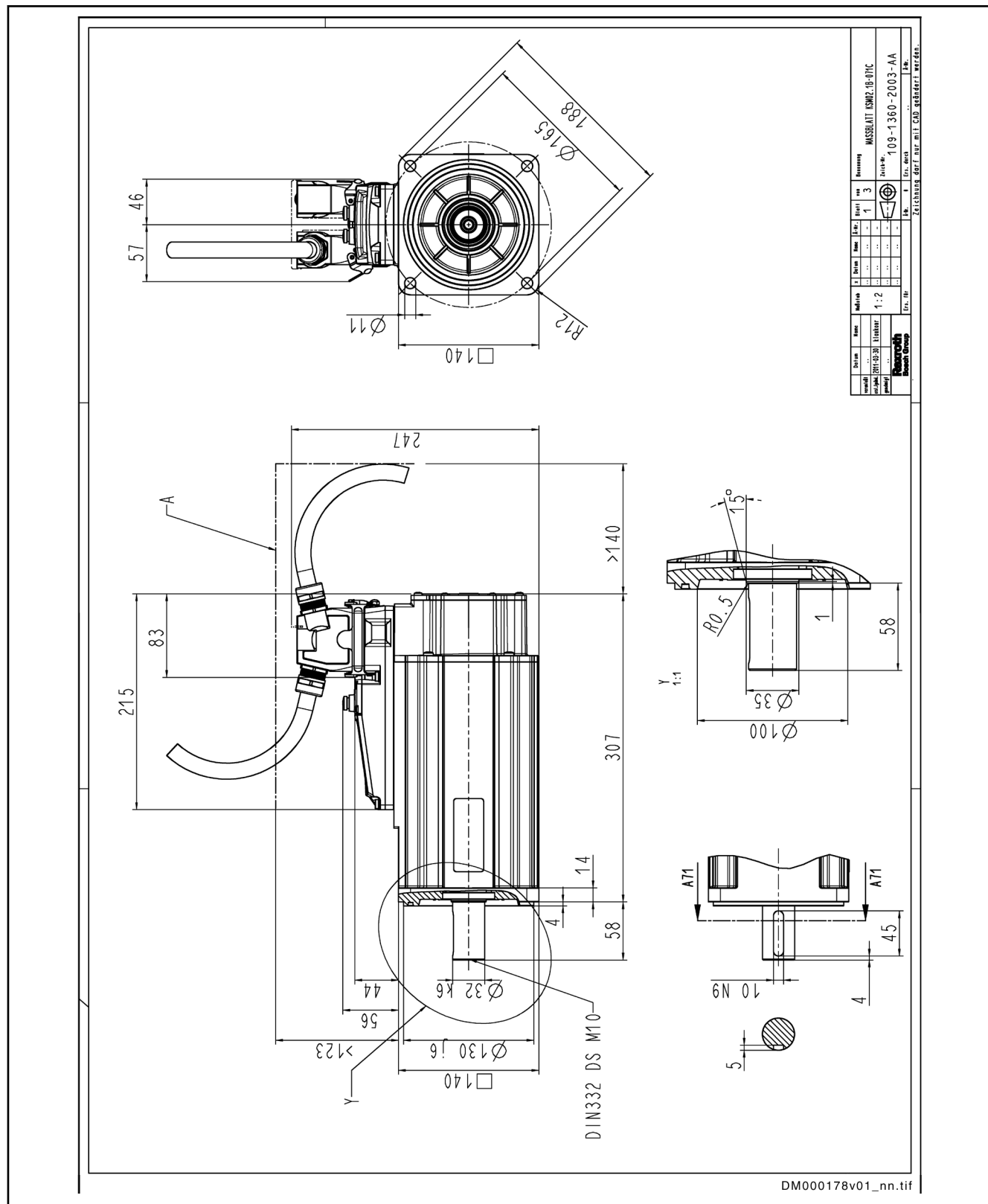
*Fig.3-3: Dimensions KSM02.1B-041C*

## Ratings and Dimensions



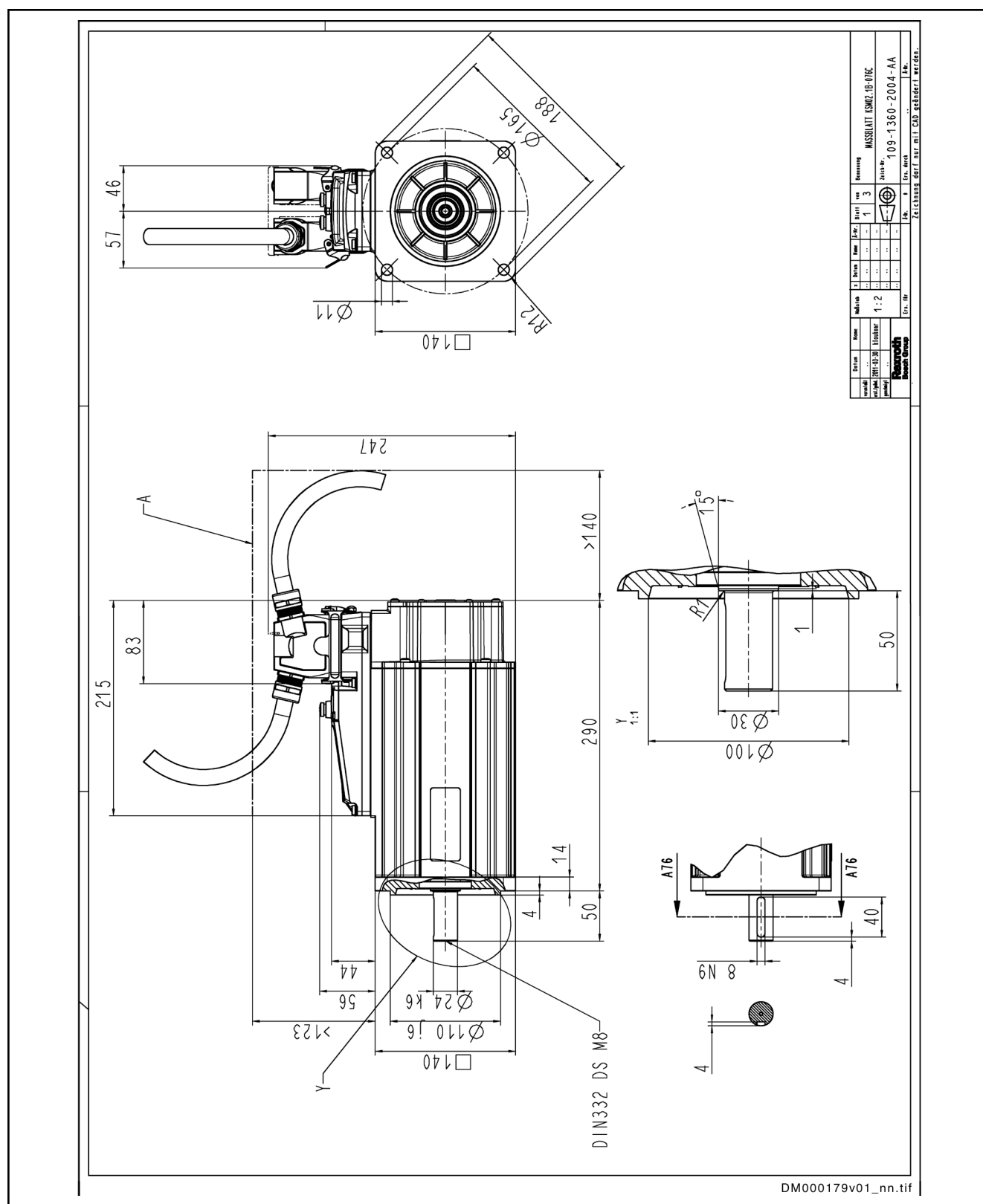
*Fig.3-4: Dimensions KSM02.1B-061C*

## Ratings and Dimensions



*Fig.3-5: Dimensions KSM02.1B-071C*

## Ratings and Dimensions



*Fig.3-6: Dimensions KSM02.1B-076C*



## 4 Documentations

### 4.1 Drive Systems, System Components

| Title<br>Rexroth IndraDrive ...                              | Kind of documentation   | Document type code <sup>1)</sup><br>DOK-INDRV*-... | Parts number<br>R911... |
|--------------------------------------------------------------|-------------------------|----------------------------------------------------|-------------------------|
| Mi Drive Systems<br>With KCU02, KSM02, KMS02                 | Project Planning Manual | KCU02+KSM02-PRxx-EN-P                              | 335702                  |
| Drive Systems With HMV01/02<br>HMS01/02, HMD01, HCS02/03     | Project Planning Manual | SYSTEM*****-PRxx-EN-P                              | 309635                  |
| Cs<br>Drive Systems With HCS01                               | Project Planning Manual | HCS01*****-PRxx-EN-P                               | 322209                  |
| Supply Units, Power Sections<br>HMF, HMS, HMD, HCS02, HCS03  | Project Planning Manual | HMF-S-D+HCS-PRxx-EN-P                              | 318789                  |
| Drive Controllers<br>Control Sections CSB01, CSH01,<br>CDB01 | Project Planning Manual | CSH*****-PRxx-EN-P                                 | 295011                  |
| Additional Components and Accessories                        | Project Planning Manual | ADDCOMP****-PRxx-EN-P                              | 306139                  |
| C Drive Controllers<br>HCS02.1, HCS03.1                      | Operating Instructions  | FU*****-IBxx-EN-P                                  | 314904                  |

1) In the document type codes, "xx" is a wild card for the current edition of the documentation (example: PR01 is the first edition of a Project Planning Manual)

Fig.4-1: Documentations – Overview

| Title                                                          | Kind of documentation | Document type code <sup>1)</sup>     | Parts number<br>R911... |
|----------------------------------------------------------------|-----------------------|--------------------------------------|-------------------------|
| Automation Terminals<br>Of The Rexroth Inline<br>Product Range | Application Manual    | DOK-CONTRL-ILSYSINS***-<br>AWxx-EN-P | 317017                  |

1) In the document type codes, "xx" is a wild card for the current edition of the documentation (example: AW01 is the first edition of an Application Manual)

Fig.4-2: Documentations – Overview

### 4.2 Motors

| Title<br>Rexroth IndraDyn ...    | Kind of documentation   | Document type code <sup>1)</sup><br>DOK-MOTOR*-... | Parts number<br>R911... |
|----------------------------------|-------------------------|----------------------------------------------------|-------------------------|
| A Asynchronous Motors MAD / MAF  | Project Planning Manual | MAD/MAF****-PRxx-EN-P                              | 295054                  |
| H Synchronous Kit Spindle Motors | Project Planning Manual | MBS-H*****-PRxx-EN-P                               | 297894                  |
| L Synchronous Linear Motors      | Project Planning Manual | MLF*****-PRxx-EN-P                                 | 293634                  |

## Documentations

| Title<br>Rexroth IndraDyn ... | Kind of documentation   | Document type code <sup>1)</sup><br>DOK-MOTOR*-... | Parts number<br>R911... |
|-------------------------------|-------------------------|----------------------------------------------------|-------------------------|
| S Synchronous Motors MSK      | Project Planning Manual | MSK*****-PRxx-EN-P                                 | 296288                  |
| T Synchronous Torque Motors   | Project Planning Manual | MBT*****-PRxx-EN-P                                 | 291224                  |

1) In the document type codes, "xx" is a wild card for the current edition of the documentation (example: PR01 is the first edition of a Project Planning Manual)

Fig. 4-3: Documentations – Overview

## 4.3 Cables

| Title                                                | Kind of documentation | Document type code <sup>1)</sup><br>DOK-... | Parts number<br>R911... |
|------------------------------------------------------|-----------------------|---------------------------------------------|-------------------------|
| Rexroth Connection Cables<br>IndraDrive and IndraDyn | Selection Data        | CONNEX-CABLE*INDRV-CAxx-EN-P                | 322948                  |

1) In the document type codes, "xx" is a wild card for the current edition of the documentation (example: CA02 is the second edition of the documentation "Selection Data")

Fig. 4-4: Documentations – Overview

## 4.4 Firmware

| Title<br>Rexroth IndraDrive ...              | Kind of documentation | Document type code <sup>1)</sup><br>DOK-INDRV*-... | Parts number<br>R911... |
|----------------------------------------------|-----------------------|----------------------------------------------------|-------------------------|
| MPx-17<br>Functions                          | Application Manual    | MP*-17VRS**-APxx-EN-P                              | 331235                  |
| MPx-17<br>Version Notes                      | Release Notes         | MP*-17VRS**-RNxx-EN-P                              | 331587                  |
| MPx-16 and MPx-17<br>Parameters              | Reference Book        | GEN1-PARA**-RExx-EN-P                              | 328650                  |
| MPx-16 and MPx-17<br>Diagnostic Messages     | Reference Book        | GEN1-DIAG**-RExx-EN-P                              | 326539                  |
| Integrated Safety Technology<br>as of MPx-1x | Application Manual    | SI3-**VRS**-APxx-EN-P                              | 332633                  |

1) In the document type codes, "xx" is a wild card for the current edition of the documentation (example: RE02 is the second edition of a Reference Book)

Fig. 4-5: Documentations – Firmware

## 5 Instructions for Use

### 5.1 Handling of the Devices

#### ⚠ CAUTION

Damage or injuries and invalidation of the warranty due to improper handling!

Avoid mechanical stressing, throwing, tipping or dropping of the products.

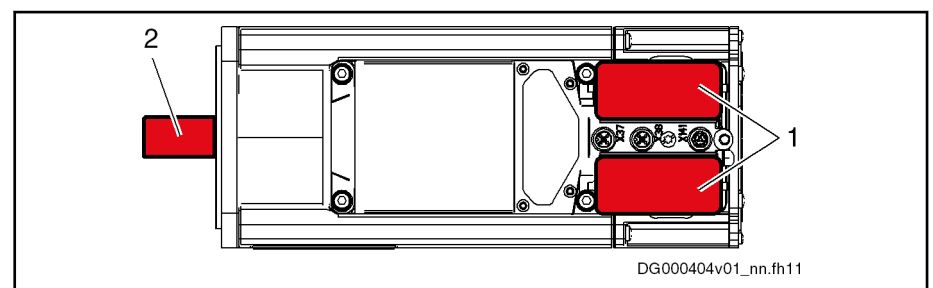
Use only suitable tackles.

Use suitable protective equipment and protective clothing during transport. Wear safety shoes.

Protect the products against dampness and corrosion.

On delivery, motors have protective sleeves and covers on the output shafts and on the flange sockets. During transport and storage, the protective sleeves must remain on the motor.

- Remove the protective sleeves just before mounting.
- Also use the protective sleeves if you return the goods.



- 1 Transport protection  
2 Protective sleeve for shaft

Fig.5-1: Protective Sleeves

- Avoid damage to the motor flange and drive shaft.
- Avoid impacts on the drive shaft.

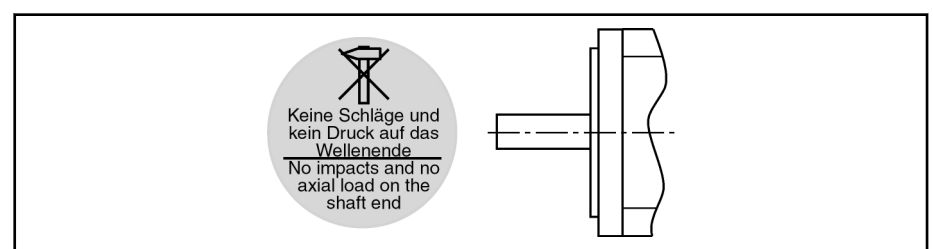


Fig.5-2: Handling the Shaft End

Impacts on the shaft end damage encoder and ball bearing! Driving elements, such as pulleys, coupling disks or toothed wheels, may only be mounted or dismounted by evenly heating up the driving elements or with the appropriate tool for mounting and dismounting.

## Instructions for Use

## 5.2 Mounting

### 5.2.1 Required Steps to Follow

#### Preparations

Make the following preparations for mounting:

1. Procure tools, auxiliary materials, measuring and test equipment.
2. Check all components for visible damage. Defective components mustn't be mounted.
3. Ensure that dimensions and tolerances on the installation side are suitable for motor attachment (for details, see dimensional drawing).
4. Check whether all components, mounting surfaces and threads are clean.
5. Ensure that mounting can be done in a dry and dust-free environment.
6. Ensure that the holder for the motor flange is without burrs.
7. Remove the protective sleeve of the motor shaft and keep it for further use.

**If the Optional Holding Brake is Used**

Check whether the motor holding brake attains the holding torque specified in the data sheet. If the holding brake does not attain the specified holding torque, check the functioning of the holding brake (see index entry "Holding brake → Commissioning").

#### Mounting KSM

**Mounting for Easy Servicing**

To allow trouble-free servicing, make sure that the following aspects are fulfilled after you have mounted KSM:

- Connection points X37, X38 and X141 are easily accessible
  - Connection points X108 and X109 are easily accessible  
To allow easy and quick drive diagnostics, the terminal connector of the communication cable should be extended to a directly accessible point
  - Address selector switches are easily accessible
  - Diagnostic LED H14 is visible
- Notes on Mounting**
- Avoid jamming or getting stuck of the centering collar on the motor side.
  - Avoid damage to the insertion fitting on the installation side.
  - Check the stability and precision of the connection before you proceed.

### 5.2.2 Mechanical Interfaces

#### Flange Assembly

Distributed servo drives KSM are manufactured for flange assembly (type of construction B05). Mounting holes details can be found in the corresponding dimensional drawing.

For flange assembly, we recommend using the screws and tightening torques listed in the table below.

| Motor size   | Recommended screw size | Tightening torque [Nm] | Minimum strength |
|--------------|------------------------|------------------------|------------------|
| KSM02.1B-041 | M6                     | 10,4                   | 8.8              |
| KSM02.1B-061 | M8                     | 25                     | 8.8              |

| Motor size                                                                                                      | Recommended screw size | Tightening torque [Nm] | Minimum strength |
|-----------------------------------------------------------------------------------------------------------------|------------------------|------------------------|------------------|
| KSM02.1B-071<br>KSM02.1B-076                                                                                    | M10                    | 51                     | 8.8              |
| The screw specifications apply when screwed into steel; for other materials, determine the reach of the screws. |                        |                        |                  |

Fig. 5-3: Mounting Screws



The screwed connections for flange assembly must be able to take up both the force due to weight of the motor and the forces acting during operation.

## 5.3 Installation

### 5.3.1 General Information on How to Install the Drive Controller

#### **⚠ WARNING**

**Lethal electric shock by live parts with more than 50 V!**

Before working on live parts: De-energize installation and secure power switch against unintentional or unauthorized re-energization.

Wait at least **30 minutes** after switching off the supply voltages to allow **discharging**.

Check whether voltage has fallen below 50 V before touching live parts!

Damage can be caused to the drive controller or circuit boards if electrostatic charging present in people and/or tools is discharged across them. For this reason, please observe the following information:

#### **NOTICE**

**Electrostatic charges can cause damage to electronic components and interfere with their operational safety!**

Exposed conductive parts coming into contact with components and circuit boards must be discharged by means of grounding. Otherwise errors may occur when controlling motors and moving elements.

Such exposed conductive parts include:

- The copper bit when soldering
- The human body (ground connection by touching a conductive, grounded object)
- Parts and tools (place them on a conductive support)

Endangered components may only be stored or dispatched in conductive packaging.



Rexroth connection diagrams are only to be used for producing installation circuit diagrams! The machine manufacturer's installation circuit diagrams must be used for wiring the installation!

- Lay signal lines separately from the load resistance lines because of the occurrence of interference.

Instructions for Use

- Transmit analog signals (e.g. command values, actual values) via shielded lines.
- Do not connect mains, DC bus or power cores to low voltages or allow them to come into contact with these.
- When carrying out a high voltage test or an applied-overvoltage withstand test on the machine's electrical equipment, disconnect all connections to the devices. This protects the electronic components (allowed in accordance with EN 60204-1). During their routine testing, Rexroth drive components are tested for high voltage (in accordance with EN 61800-5-1:2007, section 5.2.3.2) and insulation (in accordance with EN 60204-1:2006, section 18.3).

**NOTICE**

Risk of damage to the drive controller by connecting and disconnecting live connections!

Do not connect and disconnect live connections.

5.3.2 Position of Connection Points

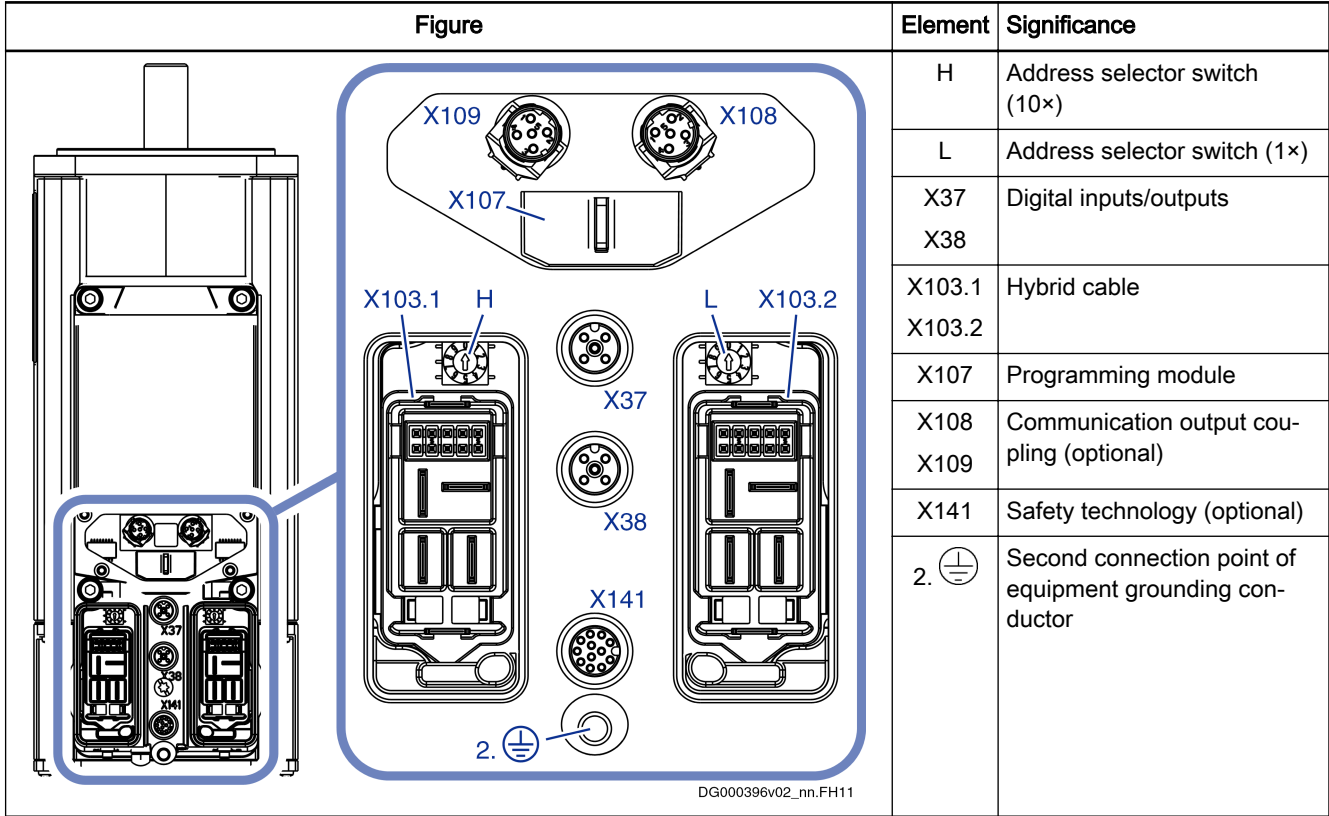


Fig.5-4: Connection Points KSM02

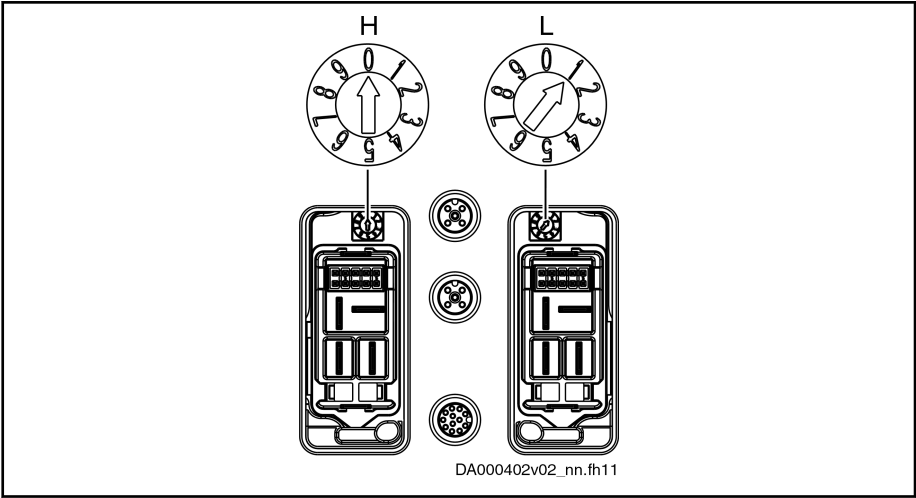
5.3.3 Address Selector Switch

**⚠ WARNING**

High electrical voltage! Danger to life by electric shock!

Before viewing the address, switch off power supply and wait until the 30-minute discharge time has elapsed. Pull off the connectors form X103.1 and X103.2 only thereafter.

Set the address for each KSM/KMS with the H and L rotary switches. The rotary switches are hidden under the X103.1 and X103.2 connector hoods.



H Address selector switch (×10)  
L Address selector switch (×1)

Fig. 5-5: Address Selector Switch

| Setting                                                                                                                                                                                      | Description                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| "00"<br>H = 0<br>L = 0                                                                                                                                                                       | "00" is the factory setting of the address selector switches.<br><br>This setting is <b>not</b> applied. The individual drive address must be set in parameter "S-0-1040, Drive address of master communication".                     |
| "01" ... "99"<br>H = 0 ... 9<br>L = 0 ... 9<br>Drive address =<br>H×10 + L                                                                                                                   | Settings of the address selector switches are applied to "S-0-1040, Drive address of master communication" during the booting process.<br><br>Example for setting drive address "14":<br>H = 1, L = 4 ⇒ drive address = 1×10 + 4 = 14 |
| See also documentation Parameter Description: <ul style="list-style-type: none"><li>"S-0-1040, Drive address of master communication"</li><li>"S-0-0096, Slave arrangement (SLKN)"</li></ul> |                                                                                                                                                                                                                                       |

Fig. 5-6: Setting the Drive Address at H and L

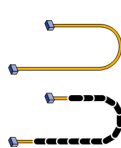
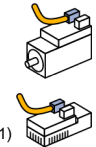
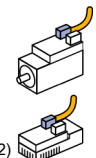
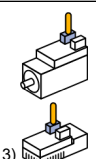
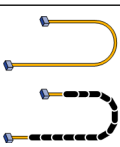


Order in drive line

The order of the addresses in a line can be selected as desired.

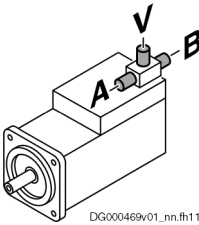
Instructions for Use

5.3.4 Selecting Hybrid Cable for Appropriate Connection

|                                                                                                                                |         |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Hybrid cable RKH<br>(with different outgoing di-<br>rections from connection<br>point X103.1 and X103.2<br>at KSM02 and KMS02) |         |  |  |  |  |
|                                                                                                                                |         | X103.1                                                                            | X103.1                                                                             | X103.1                                                                              | RKH0700                                                                             |
|                                               | KCU02   | RKH0311                                                                           | RKH0411                                                                            | RKH0511                                                                             | RKH0511                                                                             |
|                                               | X103.2  | RKH0011                                                                           | RKH0111                                                                            | RKH0213                                                                             | RKH0213                                                                             |
|                                               | X103.2  | RKH0110                                                                           | RKH0210                                                                            | RKH0215                                                                             | RKH0215                                                                             |
|                                             | X103.2  | RKH0212                                                                           | RKH0214                                                                            | RKH0610                                                                             | RKH0610                                                                             |
|                                             | RKH0700 | RKH0212                                                                           | RKH0214                                                                            | RKH0610                                                                             | - 4)                                                                                |

- 1)
- 2)
- 3)
- 4)
- Outgoing direction "A"
- Outgoing direction "B"
- Outgoing direction "V"
- If you wish to connect two cables RKH0700 to each other, use a short cable RKH0610 as intermediate piece.

Fig. 5-7: Hybrid Cables RKH



DG000469v01\_nn.th11

Hybrid cable outgoing direction:

•

A: horizontal (towards the housing)

•

B: horizontal (away from the housing)

•

V: vertical

Fig. 5-8: Hybrid Cable Outgoing Directions

### Selecting the Hybrid Cables

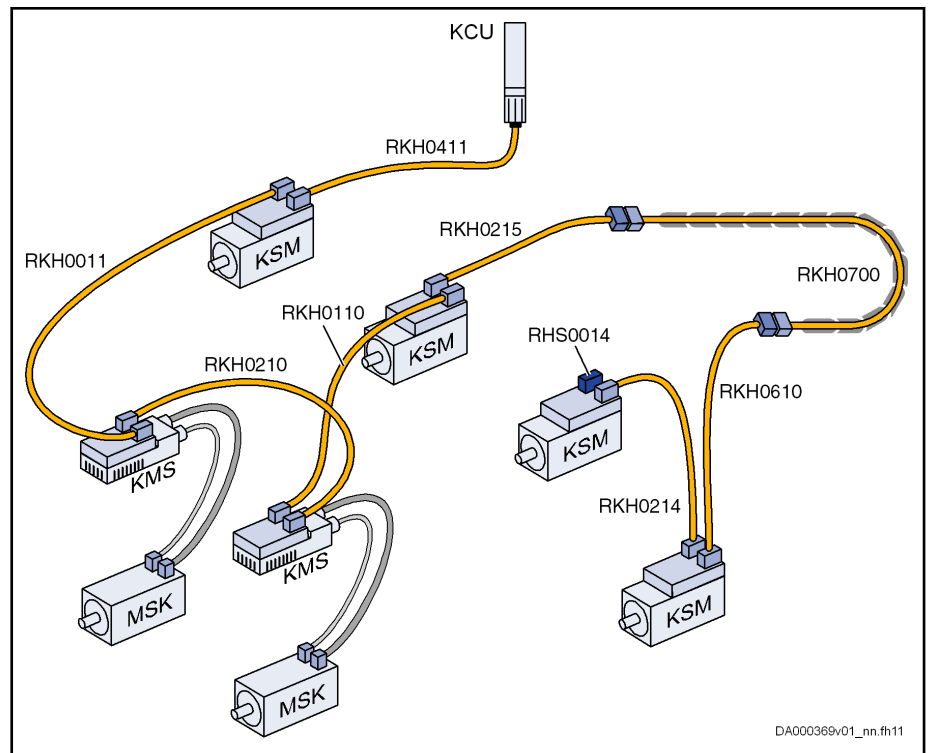


Fig. 5-9: Example of Drive System With Hybrid Cable

Each line of drives must be terminated with the terminal connector RHS0014.

All hybrid cables are suited for use in flexible cable tracks. In the example, cable RKH0700 is used in a flexible cable track. To quickly replace the flexible cable track cable for servicing, the cable in the example used in the flexible cable track has been equipped with connectors at the inputs.

### Identifying the Hybrid Cables

Hybrid cables are labeled according to the following example:

**RKH0111/030,5**

The cable designation is made up of:

Cable number  $\Rightarrow$  e.g. **RKH0111**

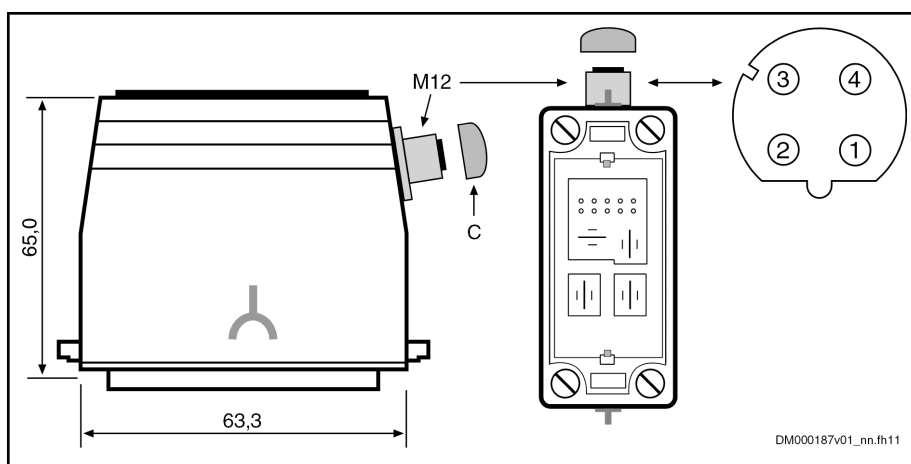
and

Cable length  $\Rightarrow$  e.g. **30.5 m**

### Terminal Connector RHS0014

Each line of drives must be terminated at the last connection point X103.2, using terminal connector RHS0014 (parts number: R911335793). The terminal connector is not coded.

## Instructions for Use



C  
M12

Protective cap  
4-pin socket, D-coded; the pins are internally connected to the contacts for Multi-Ethernet communication (Tx+, Tx-, Rx+, Rx-); the connection point can be used for engineering the drive system

Fig. 5-10:

Terminal Connector RKS0014

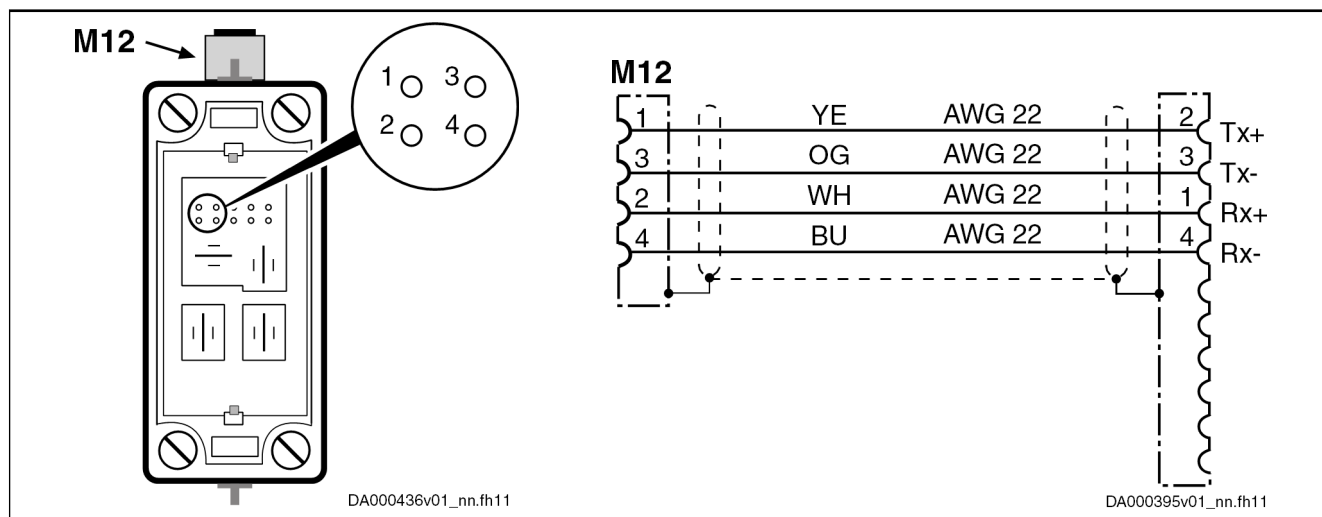


Fig. 5-11:

Internal M12 Socket Wiring



If it is difficult to access the M12 socket in your drive system:

Connect a cable (e.g. RKB0043) to the M12 socket and position the end of the cable at an easily accessible point.

## 5.3.5 X141, Safety Technology and Service Input "Release Brake"

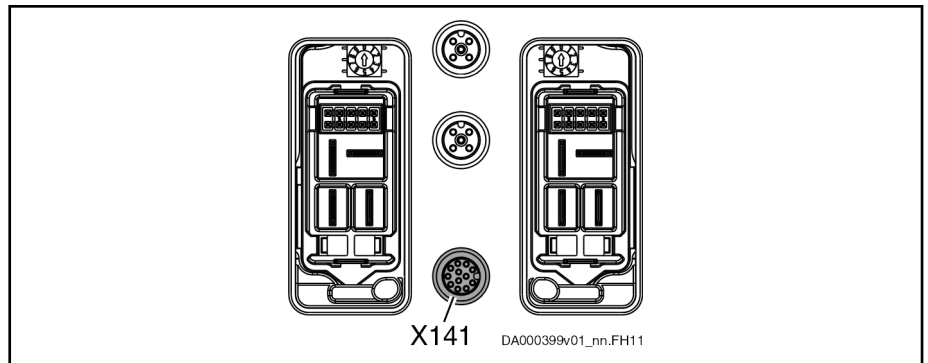
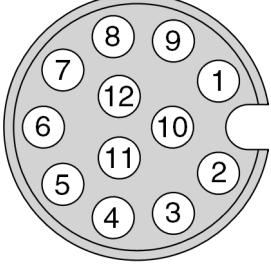


Fig. 5-12: X141

| View                                                                                                                                                               | Con-<br>nection | Signal name<br>(devices with<br>safety tech-<br>nology) | Signal name<br>(devices<br>without safe-<br>ty technolo-<br>gy <sup>1)</sup> ) | Function                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>DA000400v01_nn.FH11</p> <p><b>Female connector M12 (12-pin, D-coded)</b></p> | 1               | SI_Ch1                                                  | n. c.                                                                          | Selection of channel 1 (connected to X103.2.10)                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                    | 2               | SI_Ch2                                                  | n. c.                                                                          | Selection of channel 2 (connected to X103.2.8)                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                    | 3               | Zone_Br                                                 | Zone_Br                                                                        | X141.3 must be appropriately activated for the desired function: <ul style="list-style-type: none"> <li>Safety zone beginner:<br/>Input not used</li> <li>Safety zone user:<br/>Short-circuit with X141.11<br/>(Input voltage: 0...6 V)</li> <li>"Release brake":<br/>Short-circuit with X141.9<br/>(Input voltage: 24 V ±20%)</li> </ul> |
|                                                                                                                                                                    | 4               | +24V                                                    | n. c.                                                                          | Voltage supply                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                    | 5               | SI_Ch1_In                                               | n. c.                                                                          | Connected to X103.1.10                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                    | 6               | SI_0V_In                                                | SI_0V <sup>2)</sup>                                                            | Connected to X103.1.9                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                    | 7               | SI_Ch2_In                                               | n. c.                                                                          | Connected to X103.1.8                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                    | 8               | Dyn_Ch1                                                 | n. c.                                                                          | Dynamization output of channel 1                                                                                                                                                                                                                                                                                                          |
|                                                                                                                                                                    | 9               | 24V_Br                                                  | 24V_Br                                                                         | For function "Release brake"                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                    | 10              | SI_0V                                                   | SI_0V <sup>2)</sup>                                                            | Connected to X103.2.9                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                    | 11              | GND                                                     | GND                                                                            | For function "Safety zone user"                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                    | 12              | Dyn_Ch2                                                 | n. c.                                                                          | Dynamization output of channel 2                                                                                                                                                                                                                                                                                                          |

## Instructions for Use

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ready-made connection cable    | RKB0033                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Connector for safety zone user | <p>RBS0023</p> <p>If a KSM/KMS with optional safety technology is to be a safety zone user inside a safety zone, X141 must be fitted with connector RBS0023.</p> <p>Connector RBS0023 jumpers the following connections at X141:</p> <ul style="list-style-type: none"> <li>• 5 ↔ 1 [SI_Ch1_In ↔ SI_Ch1]</li> <li>• 7 ↔ 2 [SI_Ch2_In ↔ SI_Ch2]</li> <li>• 6 ↔ 10 [SI_0V_In ↔ SI_0V]</li> <li>• 11 ↔ 3 [GND ↔ Zone_Br]</li> </ul> |

1) KSM/KMS without optional safety technology can be operated inside the safety zone because the signals are transferred to the next safety zone user via X103.1 and X103.2. KSM/KMS without optional safety technology do not react to safety technology signals.

2) X141.6 connected to X141.10

*Fig.5-13: Function, pin assignment, properties*

## Technical data

| Function                                           | Signal  | Connection | Technical data                |
|----------------------------------------------------|---------|------------|-------------------------------|
| Selection of channel 1                             | SI_Ch1  | 1          | Digital inputs <sup>1)</sup>  |
| Selection of channel 2                             | SI_Ch2  | 2          |                               |
| Dynamization output of channel 1                   | Dyn_Ch1 | 8          | Digital outputs <sup>2)</sup> |
| Dynamization output of channel 2                   | Dyn_Ch2 | 12         |                               |
| Power supply of <b>isolated</b> inputs and outputs | +24V    | 4          | DC 19.2 ... 30 V              |
|                                                    | 0V      | 10         | Min. 100 mA<br>Max. 700 mA    |

1) See index entry "Digital inputs → Technical data, safety technology"

2) See index entry "Digital outputs → Technical data, safety technology"

*Fig.5-14: Technical data*

### 5.3.6 Second Connection Point of Equipment Grounding Conductor

Parts of the installation with attached KSM02/KMS02 must be connected to the equipment grounding system of the installation. The housings of the KSM02/KMS02 then are connected to the equipment grounding system of the installation via the flange. This connection is required in addition to the equipment grounding conductor in the hybrid cable, because the leakage current of a distributed servo drive KSM02/KMS02 is greater than 3.5 mA.

Additionally connect the KSM02/KMS02 housing via a **second** equipment grounding conductor to the equipment grounding system of the installation, when KSM02/KMS02 is attached to parts of the installation which

- have bad electroconductive properties
- or
- cannot be connected to the equipment grounding system of the installation.

 **WARNING**

High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

Connect the **second connection point of the equipment grounding conductor** at KSM02/KMS02 to the equipment grounding system of the installation, when the electric resistance across the mechanical holder of the flange and the equipment grounding system of the installation is greater than **5 ohms**.



The **first** equipment grounding conductor is routed via the hybrid cable from **X103.1 / X103.2 (KSM02/KMS02)** to connection point **X54 (KCU02)** and connected to the equipment grounding system of the installation via KCU02.

Second Equipment Grounding Conductor On the Housing

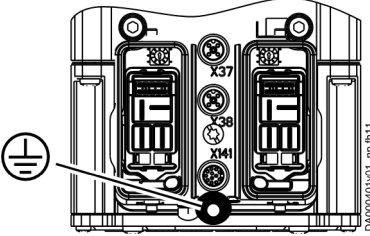
| View                                                                               | Connection                                                                        | Signal name                   | Function                                                                                                                                                     |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | Equipment grounding conductor | Second connection point of equipment grounding conductor<br><br>Is used to connect KSM02/KMS02 to a grounded part of the installation, e.g. the machine base |
| Thread M5 (for ring cable lug)                                                     | Unit                                                                              | Min.                          | Max.                                                                                                                                                         |
| Tightening torque                                                                  | Nm                                                                                | 2,6                           | 3,1                                                                                                                                                          |
| Cable cross section stranded wire                                                  | mm²                                                                               | 2,5                           | 4                                                                                                                                                            |
| Connection cable                                                                   | AWG                                                                               | 14                            | 12                                                                                                                                                           |

Fig.5-15: Second Connection Point of Equipment Grounding Conductor, Properties

5.4 Commissioning, Operation, Diagnostics and Maintenance

5.4.1 Notes on Commissioning

General Information

 **WARNING**

High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

Read and observe the detailed safety instructions contained in this documentation in chapter "Safety Instructions".

Preparation

1. Keep the documentation of all used products ready.
2. Check the products for damage.
3. Check all mechanical and electrical connections.
4. At products supplied with a touch guard, check whether the touch guard has been mounted.

Instructions for Use

- 5. Activate safety devices and monitoring systems of the installation.

Procedure

When all requirements have been fulfilled, commission the drive system according to the instructions contained in the corresponding product documentation. See the Functional Description of the firmware for the corresponding information.

The commissioning of controllers and control unit can require additional steps. The check of functionality and performance of the installations is not part of motor commissioning; instead, it is carried out within the scope of the commissioning of the machine as a whole. Observe the information and regulations of the machine manufacturer.

5.4.2 Notes on Operation

Make sure that the ambient conditions described are complied with during operation.

5.4.3 Diagnostic Functions

Diagnostic Display KSM/KMS

LED H14

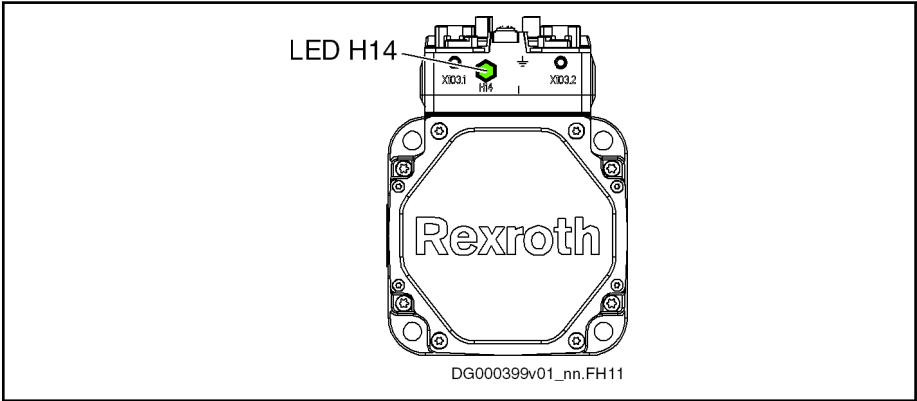


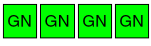
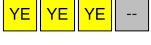
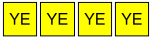
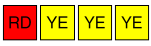
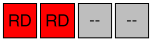
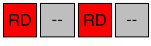
Fig. 5-16: LED H14 (Example KSM)

At the device, there is a tricolor LED which displays the drive status.

Diagnostic Display

| H14<br>Color / flashing pattern 1) |                | Significance (drive status)                                                                 | Measures                                                           |
|------------------------------------|----------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|                                    | Off            | Supply unit not switched on                                                                 | Check and, if necessary, switch on the 24-V supply                 |
|                                    |                | Cable interrupted                                                                           | Check cable and connector X18                                      |
|                                    |                | Hardware defective                                                                          | Replace hardware                                                   |
|                                    | Flashing green | Drive is error-free (phases 2, 3 and 4); in phase 4, drive is ready for drive enable ("Bb") | If necessary, read exact status via "S-0-0095, Diagnostic message" |

## Instructions for Use

| H14<br>Color / flashing pattern <sup>1)</sup>                                       |                                                                                                            | Significance (drive status)                                              | Measures                                                                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|    | Green<br>                 | Power on and DC bus voltage available ("Ab")                             | Drive is error-free in operation and runs according to inputs                                     |
|                                                                                     |                                                                                                            | Drive in control ["AF", "AH" or drive command active (Cxxs)]             |                                                                                                   |
|    | Flashing green-yellow<br> | Switching command active (C01xx/C02xx)                                   | If necessary, read exact status via "S-0-0095, Diagnostic message"                                |
|                                                                                     |                                                                                                            | Switching command error (C01xx/C02xx)                                    | Do not interrupt the 24-V supply and do not unplug connectors while the firmware is being updated |
|                                                                                     |                                                                                                            | Firmware update running<br>Loader active                                 |                                                                                                   |
|    |                           | Drive command error (Cxxxx)                                              |                                                                                                   |
|                                                                                     | Flashing yellow<br>       | Drive warning (E2xxx ... E3xxx)                                          | Read exact status via "S-0-0095, Diagnostic message" and execute service function                 |
|                                                                                     |                           | Communication warning (E4xxx)                                            |                                                                                                   |
|                                                                                     |                           | Travel range warning (E6xxx ... E7xxx)                                   |                                                                                                   |
|  | Yellow<br>              | Drive controller identification                                          |                                                                                                   |
|                                                                                     |                                                                                                            | Fatal warning (E8xxx)                                                    | Do not interrupt the 24-V supply and do not unplug connectors while the firmware is being updated |
|  | Flashing red-yellow<br> | Drive is error-free (phase 0), but not yet ready for drive enable ("Bb") | If necessary, read exact status via "S-0-0095, Diagnostic message"                                |
|                                                                                     |                         | Drive is error-free (phase 1), but not yet ready for drive enable ("Bb") |                                                                                                   |
|                                                                                     |                         | Communication error (F4xxx)                                              |                                                                                                   |
|  | Flashing red-green<br>  | Baud rate scan (P-1)                                                     | If necessary, read exact status via "S-0-0095, Diagnostic message"                                |
|  | Flashing red<br>        | Error (F2xxx, F3xxx, F6xxx, F7xxx, F8xxx)                                | Read exact status via "S-0-0095, Diagnostic message" and execute service function                 |
|                                                                                     |                         | Firmware update:                                                         | Repeat firmware update                                                                            |

## Instructions for Use

| H14<br>Color / flashing pattern <sup>1)</sup>                                    |                                                                                          | Significance (drive status) | Measures                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Red<br> | Booting phase               | Wait until booting phase is over (approx. 2 minutes)                                                                                                                                                                                                       |
|                                                                                  |                                                                                          | System error (F9xxx, E0800) | <ul style="list-style-type: none"> <li>Switch off and on; replace hardware, if necessary</li> <li>Check whether the programming module is inserted; if necessary replace KSM/KMS crosswise to check whether the programming module is defective</li> </ul> |

1) A square in the illustrated flashing patterns corresponds to a time period of 250 ms.

Fig.5-17: LED Displays H14

## Firmware Functions

**Easy Startup Mode**

Easy startup mode is intended for initial commissioning. Easy startup can be carried out with the commissioning software "Rexroth IndraWorks D".

For easy startup, the digital inputs have been preset as follows:

- I\_1 (X37.4): +24 V to activate positive direction of rotation
- I\_2 (X37.2): +24 V to activate negative direction of rotation
- I\_3 (X38.4): +24 V to activate drive enable

 See Functional Description of firmware → "Easy Startup Mode".

**Analog Outputs**

KSM/KMS have **no** analog outputs!

**Oscilloscope Function**

Use can be made of the integrated oscilloscope function described in the Functional Description of the firmware!

 See Functional Description of firmware → "Oscilloscope Function".

**Patch Function**

KSM/KMS have a patch function which allows reading or writing controller-internal memory cells.

 See Functional Description of firmware → "Patch Function".

**Monitoring Function**

For extended diagnostic possibilities, KSM/KMS have a monitoring function.

 See Functional Description of firmware → "Monitoring Function".

**Logbook Function**

The logbook function allows following the drive-internal firmware history.

 See Functional Description of firmware → "Logbook Function".

## 5.4.4 Service Functions / Troubleshooting

### Deactivating and Dismounting the Drive

#### Deactivation

In the case of malfunction, maintenance measures or to deactivate the motors, proceed as follows:

1. Observe the instructions contained in the machine documentation.
2. Use the machine-side control commands to bring the drive to a controlled standstill.
3. Switch off the power voltage and control voltage of the controller.
4. Switch off the main switch of the machine.
5. Secure the machine against accidental movements and against unauthorized operation.
6. Wait to allow the electric systems to discharge and then disconnect all electrical connections.
7. Before dismounting them, secure the motor and, if necessary, the blower unit against falling or movements, before unfastening the mechanical connections.

#### Dismounting

##### **WARNING**

**Lethal injury caused by errors when controlling motors and working at moving parts!**

- Do not work at running or unsecured installations.
- Before starting to dismount, secure the machine against accidental movements and unauthorized operation.
- Before dismounting them, secure the motor and the supply lines unit against falling or movements, before unfastening the mechanical connections.

##### **CAUTION**

**Burns caused by hot surfaces with temperatures of more than 100 °C!**

- Before beginning to work, let the motors cool down. The thermal time constant specified in the Technical Data is a measure for the time required for cooling down. Cooling down can require up to 140 minutes!
- Do not work at hot surfaces.
- Wear safety gloves.

1. Observe the instructions contained in the machine documentation.
2. Observe the Safety Instructions and carry out all steps according to the instructions for "deactivation".
3. Before dismounting them, secure the motor and the supply lines unit against falling or movements, before unfastening the mechanical connections.
4. Dismount the motor from the machine.
5. Store the motor appropriately.

## Instructions for Use

## Replacing the KSM or KMS



Always replace a defective device with a new device of the same type.

1. De-energize the machine (switch off 24V supply, too!)
2. Make sure main switch cannot be switched on again
3. **WARNING!** High electrical voltage! Danger to life by electric shock!  
Before you start replacing KSM or KMS, wait 30 minutes to allow discharging.
4. Verify zero potential
5. Dismount defective device
6. Note down positions of address selector switches of defective device
7. Remove cover from slot X107 of defective device and take out programming module
8. Set address selector switches of new device to same positions as in defective device
9. If housing of new device is dirty: Clean housing
10. When carrying out the next step, take care that dirt and moisture are prevented from inside the housing.  
Remove cover from slot X107; fit programming module of defective device to slot X107 of new device; check sealing ring of cover for damage (if sealing ring damaged: provide new sealing ring); mount cover (screw tightening torque: 1 Nm)
11. Mount new device
12. Connect new device according to machine circuit diagram
13. Switch on 24V supply
14. Put machine into ready-for-operation status again according to the machine manufacturer's instructions.
15. Check functions of the drive.

## Service Function "Release Holding Brake"

**⚠ WARNING**

**Lethal injury caused by errors when controlling motors and working at moving parts!**

- Do not work at running or unsecured installations.
- Before starting to dismount, secure the machine against accidental movements and unauthorized operation.
- Before dismounting them, secure the motor and the supply lines unit against falling or movements, before unfastening the mechanical connections.

The integrated holding brake can be "released" via interface X141.

This function requires that a voltage of 30 ... 46 V be applied to X103.1 (pins 11 and 12).



The "Release holding brake" service function may only be used while there is no communication with other drive components or an engineering tool.

If there is executable communication, the holding system monitoring command can be used to release the brake (parameter "P-0-0541, C2100 Holding system check command").

## Saving Parameters

For servicing, the drive parameters must be saved and archived on initial commissioning (e.g. with software Rexroth IndraWorks D) because it must be expected that the parameters of the defective drive cannot be read any longer.

Parameters can be managed in the control unit or saved and loaded with the "Rexroth IndraWorks D" software.

## Firmware Update

See Functional Description of firmware → "Firmware Replacement".

## 5.4.5 Maintenance

### Maintenance of the Motor Component

#### General Information

The **motors** operate in a maintenance-free way within the given operating conditions and service life. However, operation under unfavorable conditions can lead to limitations in availability.

- Increase the availability with regular preventive maintenance measures. Observe the information in the maintenance schedule of the machine manufacturer and the maintenance measures described below.

#### CAUTION

**Risk of burns by hot surfaces with temperatures of more than 100 °C!**

Before beginning to work, let the motors cool down. The thermal time constant specified in the Technical Data is a measure for the time required for cooling down. Cooling down can require up to 140 minutes!

Do not work at hot surfaces.

Wear safety gloves.

#### Cleaning

Excessive dirt, dust or shavings may affect the function of the motors adversely, may in extreme cases even cause a failure of the motors. For that reason, you should clean the cooling ribs of the motors in regular intervals (at the latest, after one year is over).

#### Bearings

The nominal service life of the bearings is  $L_{10h} > 30000$  h (according to DIN ISO 281, ed. 1990), if the permissible radial and axial forces are not exceeded.

The motor bearings should be replaced, if

- the nominal bearing service life has been reached
- running noise can be heard

## Instructions for Use



We recommend that you have the bearings replaced by Rexroth.

### Connection Cables

Check connection cables for damage in regular intervals and replace them, if necessary.

Check any optionally present flexible cable tracks for damage and replace them, if necessary.

### WARNING

**Danger to life by live parts with more than 50 V!**

Do not repair any connection cables provisionally. If the slightest damage is detected in the cable sheath, you must immediately put the installation out of operation and replace the connection cable.

Check the equipment grounding conductor for proper connection and tight fit in regular intervals.

### Holding Brake—Commissioning and Maintenance Instructions

In order to ensure proper functioning of the holding brake, it must be checked before the motors are commissioned. The test as well as the resurfacing may be carried out "mechanically by hand" or "automatically by means of the software function".

#### Checking and resurfacing of holding brakes by hand

Measure the holding torque (M4) of the holding brake. If necessary, resurface the holding brake.

#### Measuring the Holding Torque (M4) of the Holding Brake

1. De-energize the motor and secure it against re-energization.
2. Measure the transferable holding torque of the holding brake with a torque wrench. For holding torque (M4) refer to the technical data.

If the holding torque (M4) is achieved, the motor is ready for assembly.  
If the holding torque (M4) **is not achieved**, the subsequent resurfacing-process can be used to reconstitute the holding torque.

#### Resurfacing the Holding Brake

1. At closed holding brake, turn the output shaft by hand, e.g. with the help of a torque wrench, by about 5 revolutions.
2. Measure the holding torque (M4).

If the holding torque (M4) is achieved, the motor is ready for assembly.  
If the specified holding torque (M4) is not attained after several grinding-in processes, the holding brake is not operable. Please, contact the Rexroth Service.

#### Checking and resurfacing of holding brakes by means of the software function

#### Checking the Holding Torque (M4) via P-0-0541, C2100 Command Holding system check

1. The efficiency of the holding brake and the opened state are checked by the control device by starting the routine "P-0-0541, C2100 Command Holding system check".

If the holding brake is operational, the drive is in an operational state after the routine was run through. If the braking torque is too low, the control device outputs a corresponding message.



The brake test can also be carried out cyclically in the framework of a preventive maintenance.

---

### Restoring the Holding Torque (M4) by means of the Software Function

*The following possibilities are available:*

1. Realization of the resurfacing routine IndraDrive "Restoring the holding torque "(see"P-0-0544, C3900 Command Resurfacing of motor holding brake"). A repeated realization of the resurfacing routine is possible.

Upon the execution of the command C3900 it is not checked whether the resurfacing of the holding brake was successful. It is recommended to execute the command C2100 (Command Holding system check) once again.

2. Resurfacing routine by superior control. Here, special control programs adapted to the machine and system concepts are required. If necessary, please contact your Bosch Rexroth distribution partner and discuss the resurfacing routine parameters for your application.



For more detailed information about software functions refer to the functional description "Rexroth IndraDrive Firmware for Drive Control Devices MPx-xx, DOK-INDRV\*-MP\*-xxVRS\*-FKxx-EN-P."

## Maintenance of the Electronic System of the Drive

The electronic system of the drive (power section and control section) operates without wear within the given operating conditions and service life. However, operation under unfavorable conditions (e.g. increased ambient temperature) can lead to limitations in availability.

---

### CAUTION

**Risk of burns by hot surfaces with temperatures of more than 60 °C!**

After switching the devices off, wait 15 minutes to allow them to cool down before touching them. Do not work at hot surfaces.

---

In regular intervals (at the latest, after one year is over), check the heat sink of the electronic system of the drive for accumulated dirt (e.g. dust deposits). Remove accumulated dirt.



## 6 EMC Measures for Design and Installation

### 6.1 Rules for Design of Installations With Drive Controllers in Compliance With EMC

The following rules are the basics for designing and installing drives in compliance with EMC.

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mains filter</b>                      | Correctly use a mains filter recommended by Rexroth for radio interference suppression in the supply feeder of the drive system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Control Cabinet Grounding</b>         | Connect all metal parts of the cabinet with one another over the largest possible surface area to establish a good electrical connection. This, too, applies to the mounting of the mains filter. If required, use serrated washers which cut through the paint surface. Connect the cabinet door to the control cabinet using the shortest possible grounding straps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Line Routing</b>                      | <p>Avoid coupling routes between lines with high potential of noise and noise-free lines; therefore, signal, mains and motor lines and power cables have to be routed separately from another. Minimum distance: 10 cm. Provide separating sheets between power and signal lines. Ground separating sheets several times.</p> <p>The lines with high potential of noise include:</p> <ul style="list-style-type: none"><li>• Lines at the mains connection (incl. synchronization connection)</li><li>• Lines at the motor connection</li><li>• Lines at the DC bus connection</li></ul> <p>Generally, interference injections are reduced by routing cables close to grounded sheet steel plates. For this reason, cables and wires should not be routed freely in the cabinet, but close to the cabinet housing or mounting panels. Separate the incoming and outgoing cables of the radio interference suppression filter.</p> |
| <b>Interference Suppression Elements</b> | <p>Provide the following components in the control cabinet with interference suppression combinations:</p> <ul style="list-style-type: none"><li>• Contactors</li><li>• Relays</li><li>• Solenoid valves</li><li>• Electromechanical operating hours counters</li></ul> <p>Connect these combinations directly at each coil.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Twisted Wires</b>                     | Twist unshielded wires belonging to the same circuit (feeder and return cable) or keep the surface between feeder and return cable as small as possible. Wires that are not used have to be grounded at both ends.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Lines of Measuring Systems</b>        | Lines of measuring systems must be shielded. Connect the shield to ground at both ends and over the largest possible surface area. The shield may not be interrupted, e.g. using intermediate terminals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Digital Signal Lines</b>              | Ground the shields of digital signal lines at both ends (transmitter <b>and</b> receiver) over the largest possible surface area and with low impedance. In the case of bad ground connection between transmitter and receiver, additionally route a bonding conductor (min. 10 mm <sup>2</sup> ). Braided shields are better than foil shields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Analog Signal Lines</b>               | Ground the shields of analog signal lines at one end (transmitter <b>or</b> receiver) over the largest possible surface area and with low impedance. This avoids low-frequency interference current (in the mains frequency range) on the shield.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## EMC Measures for Design and Installation

**Connecting the Mains Choke** Keep connection lines of the mains choke at the drive controller as short as possible and twist them.

- Installing the Motor Power Cable**
- Use shielded motor power cables or run motor power cables in a shielded duct
  - Use the shortest possible motor power cables
  - Ground shield of motor power cable at both ends over the largest possible surface area to establish a good electrical connection
  - Run motor lines in shielded form inside the control cabinet
  - Do not use any steel-shielded lines
  - The shield of the motor power cable mustn't be interrupted by mounted components, such as output chokes, sine filters or motor filters

## 6.2 EMC-Optimal Installation in Facility and Control Cabinet

### 6.2.1 General Information

For EMC-optimal installation, a spatial separation of the interference-free area (mains connection) and the interference-susceptible area (drive components) is recommended, as shown in the figures below.



Recommendation: For EMC-optimal installation in the control cabinet, use a separate control cabinet panel for the drive components.

### 6.2.2 Division Into Areas (Zones)

Exemplary arrangements in the control cabinet: See section [Control Cabinet Design According to Interference Areas - Exemplary Arrangements, page 59](#).

We distinguish three areas:

#### 1. Interference-free area of control cabinet (**area A**):

This includes:

- Supply feeder, input terminals, fuse, main switch, mains side of mains filter for drives and corresponding connecting lines
- Control voltage or auxiliary voltage connection with power supply unit, fuse and other parts unless connection is run via the mains filter of the AC drives
- All components that are not electrically connected with the drive system

#### 2. Interference-susceptible area (**area B**):

- Mains connections between drive system and mains filter for drives, mains contactor
- Interface lines of drive controller

#### 3. Strongly interference-susceptible area (**area C**):

- Motor power cables including single cores

Never run lines of one of these areas in parallel with lines of another area so that there isn't any unwanted interference injection from one area to the other and that the filter is jumpered with regard to high frequency. Use the shortest possible connecting lines.

## EMC Measures for Design and Installation

Recommendation for complex systems: Install drive components in one cabinet and the control units in a second, separate cabinet.

Badly grounded control cabinet doors act as antennas. Therefore, connect the control cabinet doors to the cabinet on top, in the middle and on the bottom via short equipment grounding conductors with a cross section of at least 6 mm<sup>2</sup> or, even better, via grounding straps with the same cross section. Make sure connection points have good contact.

### 6.2.3 Control Cabinet Design According to Interference Areas - Exemplary Arrangements

#### Supply Units With Regeneration



---

#### **Do not operate any additional loads at the mains filter!**

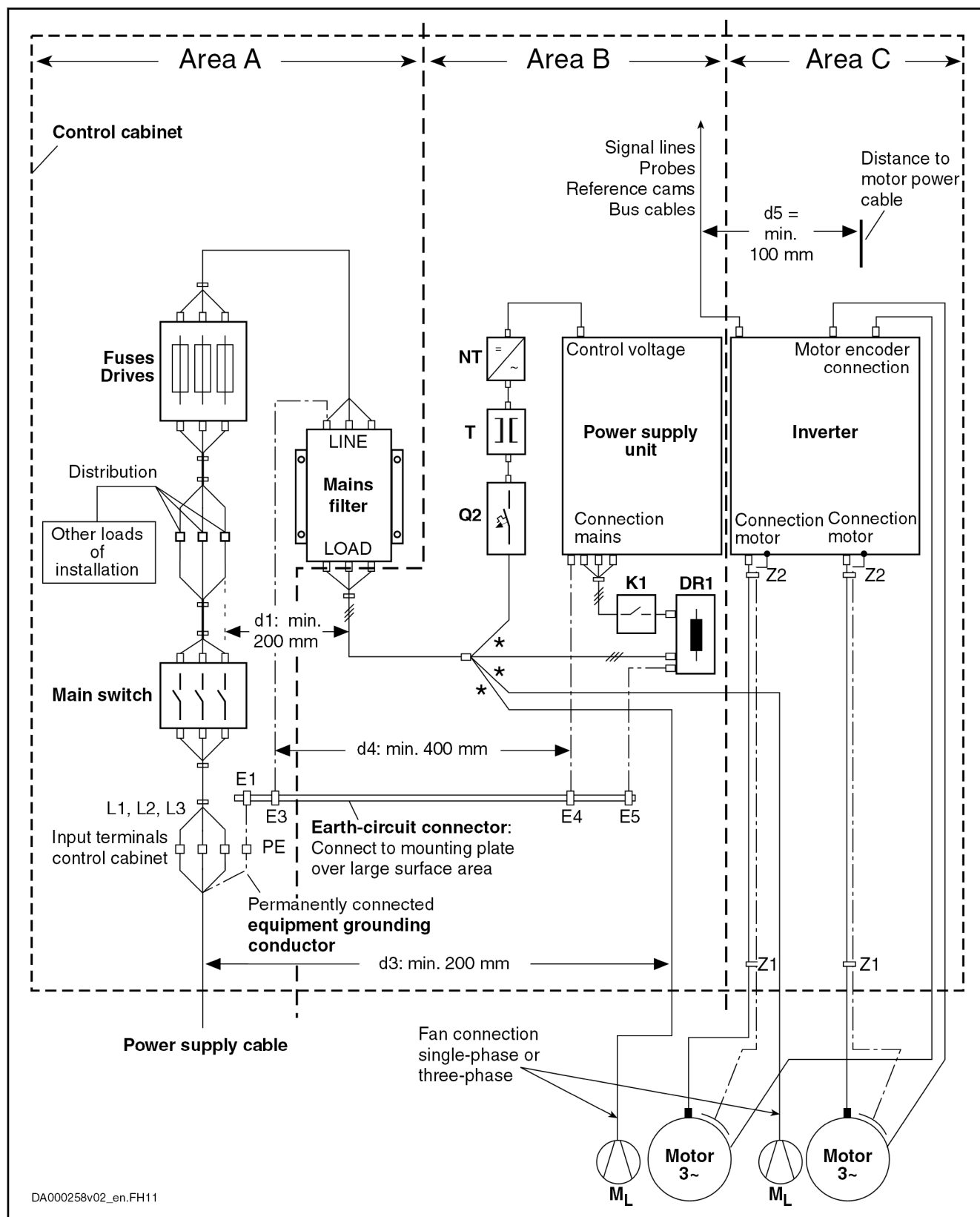
Do not operate any other loads at the connection from the mains filter output to the mains connection of the supply unit.

For motor fans and power supply units, for example, use separate mains filters.

---

## EMC Measures for Design and Installation

## Infeeding Supply Unit or Converter



## EMC Measures for Design and Installation

|                |                                                                                             |
|----------------|---------------------------------------------------------------------------------------------|
| K1             | External mains contactor for supply units and converters without integrated mains contactor |
| M <sub>L</sub> | Motor fan                                                                                   |
| NT             | Power supply unit                                                                           |
| Q2             | Fusing                                                                                      |
| T              | Transformer                                                                                 |
| Z1, Z2         | Shield connection points for cables                                                         |
| *              | Not allowed at HNF mains filter                                                             |

Fig. 6-1: *Infeeding Supply Unit or Converter – EMC Areas in the Control Cabinet*

### 6.2.4 Design and Installation in Area A - Interference-Free Area of Control Cabinet

#### Arranging the Components in the Control Cabinet

Comply with recommended distance of at least **200 mm** (distance d1 in the figure):

- Between components and electrical elements (switches, pushbuttons, fuses, terminal connectors) in the interference-free area A and the components in the two other areas B and C

Comply with recommended distance of at least **400 mm** (distance d4 in the figure):

- Between magnetic components (such as transformers, mains chokes and DC bus chokes that are directly connected to the power connections of the drive system) and the interference-free components and lines between mains and filter including the mains filter in area A

If these distances are not kept, the magnetic leakage fields are injected to the interference-free components and lines connected to the mains and the limit values at the mains connection are exceeded in spite of the installed filter.

#### Cable Routing of the Interference-Free Lines to the Mains Connection

Comply with recommended distance of at least **200 mm** (distance d1 and d3 in the figure):

- Between supply feeder or lines between filter and exit point from the control cabinet in area A and the lines in area B and C

If this is impossible, there are two alternatives:

1. Install lines in shielded form and connect the shield at several points (at least at the beginning and at the end of the line) to the mounting plate or the control cabinet housing over a large surface area.
2. Separate lines from the other interference-susceptible lines in areas B and C by means of a grounded distance plate vertically attached to the mounting plate.

Install the shortest possible lines within the control cabinet and install them directly on the grounded metal surface of the mounting plate or of the control cabinet housing.

Mains supply lines from areas B and C must not be connected to the mains without a filter.



In case you do not observe the information on cable routing given in this section, the effect of the mains filter is totally or partly neutralized. This will cause the noise level of the interference emission to be higher within the range of 150 kHz to 40 MHz and the limit values at the connection points of the machine or installation will thereby be exceeded. Consider the specified distances to be recommended data, provided that the dimensions of the control cabinet allow installing the lines accordingly.

## EMC Measures for Design and Installation

|                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Routing and Connecting a Neutral Conductor (N)                                                  | If a neutral conductor is used together with a three-phase connection, it must not be installed unfiltered in zones B and C, in order to keep interference off the mains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Motor Fan at Mains Filter                                                                       | <p>Single-phase or three-phase supply lines of motor fans, that are usually routed in parallel with motor power cables or interference-susceptible lines, must be filtered:</p> <ul style="list-style-type: none"> <li>• In drive systems with <b>regenerative supply units</b>, via a separate single-phase (NFE type) or three-phase filter (HNF type) near the mains connection of the control cabinet</li> <li>• In drive systems with <b>only infeeding supply units</b>, via the available three-phase filter of the drive system</li> </ul> <p>When switching power off, make sure the fan is not switched off.</p> <p>When switching power off, make sure the fan is not switched off.</p> |
| Loads at Mains Filter of Drive System                                                           | <p> <b>Only operate allowed loads at the mains filter of the drive system!</b></p> <p>At the three-phase filter for the power connection of regenerative supply units, it is only allowed to operate the following loads:</p> <ul style="list-style-type: none"> <li>• HMV supply unit with mains choke and, if necessary, mains contactor</li> </ul> <p>Do not operate any motor fans, power supply units etc. at the mains filter of the drive system.</p>                                                                                                                                                      |
| Shielding Mains Supply Lines in Control Cabinet                                                 | <p>If there is a high degree of interference injection to the mains supply line within the control cabinet, although you have observed the above instructions (to be found out by EMC measurement according to standard), proceed as follows:</p> <ul style="list-style-type: none"> <li>• Only use shielded lines in area A</li> <li>• Connect shields to the mounting plate at the beginning and the end of the line by means of clips</li> </ul> <p>The same procedure may be required for long cables of more than 2 m between the point of power supply connection of the control cabinet and the filter within the control cabinet.</p>                                                      |
| Mains Filters for AC Drives                                                                     | <p>Ideally mount the mains filter on the parting line between the areas A and B. Make sure the ground connection between filter housing and housing of the drive controllers has good electrically conductive properties.</p> <p>If <b>single-phase</b> loads are connected on the load side of the filter, their current may be a maximum of 10% of the three-phase operating current. A highly imbalanced load of the filter would deteriorate its interference suppression capacity.</p> <p>If the mains voltage is more than 480 V, connect the filter to the output side of the transformer and not to the supply side of the transformer.</p>                                                |
| Grounding                                                                                       | <p>In the case of bad ground connections in the installation, the distance between the lines to the grounding points E1, E2 in area A and the other grounding points of the drive system should be at least <math>d_4 = 400 \text{ mm}</math>, in order to minimize interference injection from ground and ground cables to the power input lines.</p> <p>See also <a href="#">6.2.2 Division Into Areas (Zones)</a>, page 58.</p>                                                                                                                                                                                                                                                                 |
| Point of Connection for Equipment Grounding Conductor at Machine, Installation, Control Cabinet | <p>The equipment grounding conductor of the power cable of the machine, installation or control cabinet has to be <b>permanently connected</b> at point PE and have a <b>cross section of at least 10 mm<sup>2</sup></b> or to be complemented by a second equipment grounding conductor via separate terminal connectors (according to EN 61800-5-1:2007, section 4.3.5.5.2). If the cross section of the outer</p>                                                                                                                                                                                                                                                                               |

## EMC Measures for Design and Installation

conductor is bigger, the cross section of the equipment grounding conductor must be accordingly bigger.

### 6.2.5 Design and Installation in Area B - Interference-Susceptible Area of Control Cabinet

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arranging Components and Lines                  | <p>Modules, components and lines in area B should be placed at a distance of at least <b>d1 = 200 mm</b> from modules and lines in area A.</p> <p>Alternative: Shield modules, components and lines in area B by distance plates mounted vertically on the mounting plate from modules and lines in area A or use shielded lines.</p> <p>Only connect power supply units for auxiliary or control voltage connections in the drive system to the mains via a mains filter. See <a href="#">6.2.2 Division Into Areas (Zones)</a>, page 58.</p> <p>Install the shortest possible lines between drive controller and filter.</p> |
| Control Voltage or Auxiliary Voltage Connection | <p>Only in exceptional cases should you connect power supply unit and fusing for the control voltage connection to phase and neutral conductor. In this case, mount and install these components in area A far away from the areas B and C of the drive system. For details see section <a href="#">6.2.4 Design and Installation in Area A - Interference-Free Area of Control Cabinet</a>, page 61.</p> <p>Run the connection between control voltage connection of the drive system and power supply unit used through area B over the shortest distance.</p>                                                               |
| Line Routing                                    | <p>Run the lines along grounded metal surfaces, in order to minimize radiation of interference fields to area A (transmitting antenna effect).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 6.2.6 Design and Installation in Area C - Strongly Interference-Susceptible Area of Control Cabinet

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Influence of the Motor Power Cable | <p>Area C mainly concerns the motor power cables, especially at the connection point at the drive controller.</p> <p>The longer the motor power cable, the greater its leakage capacitance. To comply with a certain EMC limit value, the allowed leakage capacitance of the mains filter is limited. For the calculation of the leakage capacitance, see the documentation on the drive system of the drive controller used.</p> |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



- Run the shortest possible motor power cables.
- Only use **shielded** motor power cables by Rexroth.

## 6.3 Ground Connections

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Housing and Mounting Plate | <p>By means of appropriate ground connections, it is possible to avoid the emission of interference, because interference is discharged to ground on the shortest possible way.</p> <p>Ground connections of the metal housings of EMC-critical components (such as filters, devices of the drive system, connection points of the cable shields, devices with microprocessor and switching power supply units) have to be well contacted over a large surface area. This also applies to all screw connections between mounting plate and control cabinet wall and to the mounting of a ground bus to the mounting plate.</p> <p>The best solution is to use a zinc-coated mounting plate. Compared to a lacquered plate, the connections in this case have a good long-time stability.</p> |
| Connection Elements        | <p>For lacquered mounting plates, always use screw connections with tooth lock washers and zinc-coated, tinned screws as connection elements. At the con-</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## EMC Measures for Design and Installation

|                                            |                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            | <p>nection points, remove the lacquer so that there is safe electrical contact over a large surface area. You achieve contact over a large surface area by means of bare connection surfaces or several connection screws. For screw connections, you can establish the contact to lacquered surfaces by using tooth lock washers.</p>                               |
| <b>Metal Surfaces</b>                      | <p>Always use connection elements (screws, nuts, plain washers) with good electroconductive surface.</p> <p>Bare zinc-coated or tinned metal surfaces have <b>good electroconductive properties</b>.</p> <p>Anodized, yellow chromatinized, black gunmetal finish or lacquered metal surfaces have <b>bad electroconductive properties</b>.</p>                      |
| <b>Ground Wires and Shield Connections</b> | <p>For connecting ground wires and shield connections, it is not the cross section but the size of contact surface that is important, as the high-frequency interference currents mainly flow on the surface of the conductor.</p> <p>Always connect cable shields, especially shields of the motor power cables, to ground potential over a large surface area.</p> |

## 6.4 Installing Signal Lines and Signal Cables

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Line Routing</b> | <p>For measures to prevent interference, see the Project Planning Manuals of the respective device. In addition, we recommend the following measures:</p> <ul style="list-style-type: none"> <li>• Route signal and control lines separately from the power cables with a minimum distance of <b>d5 = 100 mm</b> (see <a href="#">6.2.2 Division Into Areas (Zones)</a>, <a href="#">page 58</a>) or with a grounded separating sheet. The optimum way is to route them in separate cable ducts. If possible, lead signal lines into the control cabinet at one point only.</li> <li>• If signal lines are crossing power cables, route them in an angle of 90° in order to avoid interference injection.</li> <li>• Ground spare cables, that are not used and have been connected, at least at both ends so that they do not have any antenna effect.</li> <li>• Avoid unnecessary line lengths.</li> <li>• Run cables as close as possible to grounded metal surfaces (reference potential). The ideal solution are closed, grounded cable ducts or metal pipes which, however, is only obligatory for high requirements (sensitive instrument leads).</li> <li>• Avoid suspended lines or lines routed along synthetic carriers, because they are functioning like reception antennas (noise immunity) and like transmitting antennas (emission of interference). Exceptional cases are flexible cable tracks over short distances of a maximum of 5 m.</li> </ul> |
| <b>Shielding</b>    | <p>Connect the cable shield immediately at the devices in the shortest and most direct possible way and over the largest possible surface area.</p> <p>Connect the shield of <b>analog signal lines</b> at one end over a large surface area, normally in the control cabinet at the analog device. Make sure the connection to ground/housing is short and over a large surface area.</p> <p>Connect the shield of <b>digital signal lines</b> at both ends over a large surface area and in short form. In the case of potential differences between beginning and end of the line, run an additional bonding conductor in parallel. This prevents compensating current from flowing via the shield. The guide value for the cross section is 10 mm<sup>2</sup>.</p> <p>You absolutely have to equip separable connections with connectors with grounded metal housing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## EMC Measures for Design and Installation

In the case of non-shielded lines belonging to the same circuit, twist feeder and return cable.

### 6.5 General Measures of Radio Interference Suppression for Relays, Contactors, Switches, Chokes and Inductive Loads

If, in conjunction with electronic devices and components, inductive loads, such as chokes, contactors, relays are switched by contacts or semiconductors, appropriate interference suppression has to be provided for them:

- By arranging free-wheeling diodes in the case of d.c. operation
- In the case of a.c. operation, by arranging usual RC interference suppression elements depending on the contactor type, immediately at the inductance

Only the interference suppression element arranged immediately at the inductance does serve this purpose. Otherwise, the emitted noise level is too high which can affect the function of the electronic system and of the drive.



## 7 Accessories

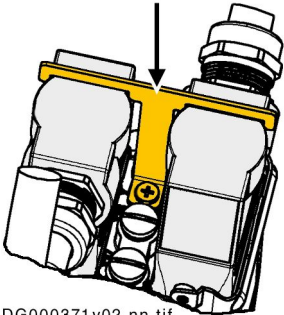
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>RBS0023 </p> <p>RKB0033 </p> <p>RKB0043 </p> <p>RKB0044 </p> <p>RKS0010 </p> <p>DG000433v01_nn.FH11</p> | <ul style="list-style-type: none"> <li>• <b>RBS0023</b><br/>Connector for safety zone user</li> <li>• <b>RKB0033</b><br/>Cable with open ends (X141 ↔ external safety unit)</li> <li>• <b>RKB0043</b><br/>Cable for communication (M12-D ↔ M12-D)</li> <li>• <b>RKB0044</b><br/>Cable for communication (M12-D ↔ RJ45)</li> <li>• <b>RKS0010</b><br/>Cable with open ends (M12-A ↔ open)</li> </ul> |
| <p>HAS10</p>  <p>DG000371 v02.nn.tif</p>                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>• <b>HAS10</b><br/>Fixing clip for hybrid cables</li> </ul>                                                                                                                                                                                                                                                                                                  |

Fig. 7-1: Accessories



## 8 Service and Support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

### Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Helpdesk & Hotline** under:

Phone: **+49 9352 40 5060**  
Fax: **+49 9352 18 4941**  
E-mail: [service.svc@boschrexroth.de](mailto:service.svc@boschrexroth.de)  
Internet: <http://www.boschrexroth.com>

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

### Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

### Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances resulting in the malfunction
- Type plate name of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your email address)



## 9 Environmental Protection and Disposal

### 9.1 Environmental Protection

|                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                       |                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Production Processes</b>                                                                                                                                                                           | The products are made with energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                       |                                                                                                                                                                                                           |
| <b>No Release of Hazardous Substances</b>                                                                                                                                                             | Our products do not contain any hazardous substances which may be released in the case of appropriate use. Normally, our products will not have any negative influences on the environment.                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                       |                                                                                                                                                                                                           |
| <b>Significant Components</b>                                                                                                                                                                         | Basically, our products contain the following components: <table border="0"> <tr> <td> <b>Electronic devices</b> <ul style="list-style-type: none"> <li>• steel</li> <li>• aluminum</li> <li>• copper</li> <li>• synthetic materials</li> <li>• electronic components and modules</li> </ul> </td><td> <b>Motors</b> <ul style="list-style-type: none"> <li>• steel</li> <li>• aluminum</li> <li>• copper</li> <li>• brass</li> <li>• magnetic materials</li> <li>• electronic components and modules</li> </ul> </td></tr> </table> | <b>Electronic devices</b> <ul style="list-style-type: none"> <li>• steel</li> <li>• aluminum</li> <li>• copper</li> <li>• synthetic materials</li> <li>• electronic components and modules</li> </ul> | <b>Motors</b> <ul style="list-style-type: none"> <li>• steel</li> <li>• aluminum</li> <li>• copper</li> <li>• brass</li> <li>• magnetic materials</li> <li>• electronic components and modules</li> </ul> |
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### 9.2 Disposal

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Return of Products</b>         | <p>Our products can be returned to our premises free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt. Furthermore, the products returned for disposal must not contain any undue foreign material or foreign components.</p> <p>Send the products "free domicile" to the following address:</p> <p style="text-align: center;">Bosch Rexroth AG<br/>Electric Drives and Controls<br/>Buergermeister-Dr.-Nebel-Strasse 2<br/>97816 Lohr am Main, Germany</p>                                                                                                                                                                                                                                                                                    |
| <b>Packaging</b>                  | <p>The packaging materials consist of cardboard, wood and polystyrene. These materials can be recycled anywhere without any problem.</p> <p>For ecological reasons, please refrain from returning the empty packages to us.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Batteries and Accumulators</b> | <p>Batteries and accumulators can be labeled with this symbol.</p> <div style="text-align: center;">  </div> <p>The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.</p> <p>The end user within the EU is legally obligated to return used batteries. Outside the validity of the EU Directive 2006/66/EC keep the stipulated directives.</p> <p>Used batteries can contain hazardous substances, which can harm the environment or the people's health when they are improperly stored or disposed of. After use, the batteries or accumulators contained in Rexroth products have to be properly disposed of according to the country-specific collection.</p> |
| <b>Recycling</b>                  | <p>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 modules.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Environmental Protection and Disposal

Metals contained in electric and electronic modules can also be recycled by means of special separation processes.

Products made of plastics can contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the valid legal requirements.

## 10 Appendix

### 10.1 Digital Inputs and Outputs

#### 10.1.1 Digital Inputs (Safety Technology "L Options")

The digital inputs correspond to IEC 61131, type 2.

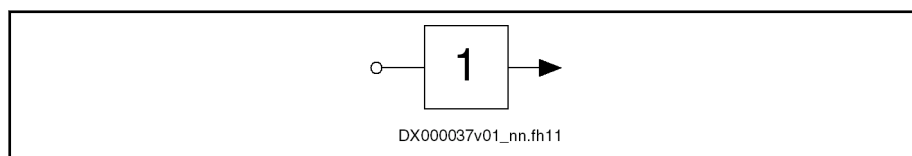


Fig. 10-1: Symbol

| Data                  | Unit | Min.      | Typ. | Max. |
|-----------------------|------|-----------|------|------|
| Allowed input voltage | V    | 0         |      | 30   |
| On                    | V    | 11        |      |      |
| Off                   | V    |           |      | 5    |
| Input current         |      |           |      |      |
| On                    | mA   | 7         |      |      |
| Off                   | mA   |           |      | 2    |
| Input resistance      | kΩ   | 1 ... 3,5 |      |      |

Fig. 10-2: Digital Inputs (Safety Technology "L Options")

#### 10.1.2 Digital Outputs (Safety Technology "L Options")

The digital outputs are compatible with digital inputs of types 1, 2 and 3 (IEC 61131).

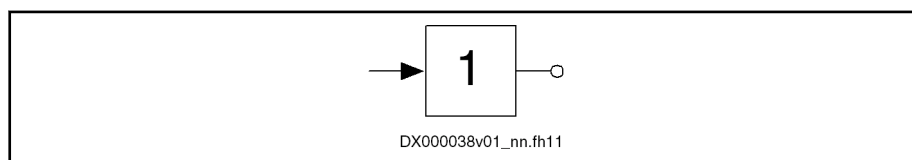


Fig. 10-3: Symbol

| Data                              | Unit | Min.      | Typ. | Max. |
|-----------------------------------|------|-----------|------|------|
| Output voltage ON                 | V    | 11        | 24   | 30   |
| Output voltage OFF                | V    |           |      | 5    |
| Output current OFF                | mA   |           |      | 2    |
| Allowed output current per output | mA   |           |      | 300  |
| Short circuit protection          |      | Available |      |      |
| Overload protection               |      | Available |      |      |

Fig. 10-4: Digital Outputs (Safety Technology "L Options")



# Index

## A

|                                |    |
|--------------------------------|----|
| Accessories.....               | 67 |
| Accumulators.....              | 71 |
| Additional documentations..... | 35 |
| Address selector switch        |    |
| Communication .....            | 40 |
| Analog outputs.....            | 50 |

## B

|                   |    |
|-------------------|----|
| Batteries.....    | 71 |
| Bearings          |    |
| Maintenance ..... | 53 |

## C

|                                                |    |
|------------------------------------------------|----|
| Cables                                         |    |
| Documentation .....                            | 36 |
| Maintenance .....                              | 54 |
| Selection .....                                | 42 |
| Cleaning.....                                  | 53 |
| Commissioning.....                             | 47 |
| Communication                                  |    |
| Address selector switch .....                  | 40 |
| Components                                     |    |
| Documentations .....                           | 35 |
| Connection                                     |    |
| Second connection point of equipment           |    |
| grounding conductor .....                      | 46 |
| Connection points.....                         | 40 |
| Contained substances                           |    |
| see "Significant components" .....             | 71 |
| Control cabinet                                |    |
| Area A, interference-free .....                | 61 |
| Area B, interference-susceptible .....         | 63 |
| Area C, strongly interference-susceptible .... | 63 |
| Interference areas .....                       | 59 |
| Cooling ribs.....                              | 53 |

## D

|                                          |    |
|------------------------------------------|----|
| Deactivation                             |    |
| Of the drive .....                       | 51 |
| Diagnostic display                       |    |
| KSM/KMS (LED H14) .....                  | 48 |
| Diagnostics                              |    |
| Functions .....                          | 48 |
| LEDs .....                               | 48 |
| Digital inputs                           |    |
| Technical data; safety technology "L op- |    |
| tions" .....                             | 73 |
| Digital outputs                          |    |
| Technical data; safety technology "L op- |    |
| tions" .....                             | 73 |
| Dimensions.....                          | 27 |
| Dismounting                              |    |
| The drive .....                          | 51 |

## D

|                                 |    |
|---------------------------------|----|
| Disposal.....                   | 71 |
| Documentation                   |    |
| Additional documentations ..... | 35 |
| Cables .....                    | 36 |
| Drive systems .....             | 35 |
| Firmware .....                  | 36 |
| Motors .....                    | 35 |
| Overview .....                  | 35 |
| System components .....         | 35 |

## E

|                                            |    |
|--------------------------------------------|----|
| Easy startup mode.....                     | 50 |
| EMC                                        |    |
| Measures for design and installation ..... | 57 |
| Environmental protection.....              | 71 |
| Equipment grounding conductor              |    |
| Second connection point of equipment       |    |
| grounding conductor .....                  | 46 |

## F

|                      |    |
|----------------------|----|
| Firmware             |    |
| Documentation .....  | 36 |
| Functions .....      | 50 |
| Update .....         | 53 |
| Flange assembly..... | 38 |

## G

|                         |    |
|-------------------------|----|
| Ground connections..... | 63 |
|-------------------------|----|

## H

|                                              |    |
|----------------------------------------------|----|
| H, L                                         |    |
| Communication - address selector switch .... | 40 |
| H14                                          |    |
| LED (KSM/KMS) .....                          | 48 |
| Handling                                     |    |
| Of the devices .....                         | 37 |
| Hazardous substances.....                    | 71 |
| Heat dissipation.....                        | 53 |
| Holding brake                                |    |
| Commissioning .....                          | 54 |
| Hybrid cables                                |    |
| Identification .....                         | 43 |
| Outgoing direction .....                     | 42 |
| Selection .....                              | 42 |

## I

|                           |    |
|---------------------------|----|
| Identification.....       | 23 |
| RKH .....                 | 43 |
| Installation.....         | 39 |
| EMC measures .....        | 57 |
| General information ..... | 39 |

## Index

**I**

|                           |    |
|---------------------------|----|
| ...Installation           |    |
| Ground connections .....  | 63 |
| Signal lines .....        | 64 |
| Instructions for use..... | 37 |

**K**

|                                                                   |    |
|-------------------------------------------------------------------|----|
| KMS                                                               |    |
| LED H14 .....                                                     | 48 |
| Maintenance .....                                                 | 53 |
| KMS02                                                             |    |
| Replace .....                                                     | 52 |
| Second connection point of equipment<br>grounding conductor ..... | 46 |
| KSM                                                               |    |
| LED H14 .....                                                     | 48 |
| Maintenance .....                                                 | 53 |
| Scope of supply .....                                             | 25 |
| KSM02                                                             |    |
| Replace .....                                                     | 52 |
| Safety technology, connection point X141 ...                      | 45 |
| Second connection point of equipment<br>grounding conductor ..... | 46 |

**L**

|                       |    |
|-----------------------|----|
| LED                   |    |
| H14 (KSM/KMS) .....   | 48 |
| Logbook function..... | 50 |

**M**

|                                                                    |    |
|--------------------------------------------------------------------|----|
| Mains filter                                                       |    |
| Motor fan .....                                                    | 62 |
| Other loads .....                                                  | 62 |
| Maintenance                                                        |    |
| KMS .....                                                          | 53 |
| KSM .....                                                          | 53 |
| Measures of radio interference suppression                         |    |
| For relays, contactors, switches, chokes,<br>inductive loads ..... | 65 |
| Monitoring function.....                                           | 50 |
| Motor                                                              |    |
| Documentation .....                                                | 35 |
| Motor fan                                                          |    |
| Mains filter .....                                                 | 62 |
| Mounting.....                                                      | 38 |

**N**

|                         |    |
|-------------------------|----|
| Notes on operation..... | 48 |
|-------------------------|----|

**O**

|                            |    |
|----------------------------|----|
| Oscilloscope function..... | 50 |
| Outgoing direction         |    |
| Hybrid cables .....        | 42 |

**P**

|                               |    |
|-------------------------------|----|
| Packaging.....                | 71 |
| Parameters                    |    |
| Saving .....                  | 53 |
| Patch function.....           | 50 |
| Power consumption.....        | 27 |
| Production processes.....     | 71 |
| Project planning manuals..... | 35 |

**R**

|                          |    |
|--------------------------|----|
| Ratings.....             | 27 |
| Recycling.....           | 71 |
| Release brake            |    |
| Service input .....      | 45 |
| Replacing                |    |
| KMS02 .....              | 52 |
| KSM02 .....              | 52 |
| Return of products.....  | 71 |
| RHS0014                  |    |
| Terminal connector ..... | 43 |
| RKH.....                 | 42 |
| Running noise.....       | 53 |

**S**

|                             |    |
|-----------------------------|----|
| Safety instructions.....    | 15 |
| Safety technology           |    |
| X141 (KSM02) .....          | 45 |
| Scope of supply             |    |
| KSM .....                   | 25 |
| Service input               |    |
| Release brake .....         | 45 |
| Signal lines                |    |
| Installation .....          | 64 |
| Significant components..... | 71 |
| Support                     |    |
| See service hotline .....   | 69 |

**T**

|                                                           |    |
|-----------------------------------------------------------|----|
| Technical data                                            |    |
| Digital inputs; safety technology "L options" .           | 73 |
| Digital outputs; safety technology "L op-<br>tions" ..... | 73 |
| Terminal connector                                        |    |
| RHS0014 .....                                             | 43 |
| Troubleshooting.....                                      | 51 |
| Type plates.....                                          | 24 |

**U**

|                    |    |
|--------------------|----|
| Use                |    |
| Instructions ..... | 37 |

**V**

|                            |    |
|----------------------------|----|
| Voltage load capacity..... | 27 |
|----------------------------|----|

Index

**X**  
X141  
    Safety technology ..... 45

**X**  
...X141  
    Service input "Release brake" ..... 45



## Notes

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