ต้นฉบับ

SRTET
S.R.T. Electrified Train Company Limited

สัญญาซื้อขาย

สัญญาเลขที่ รฟท.ช.๖๖๐๐๗๘

สัญญาฉบับนี้ทำขึ้น ณ บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด เลขที่ ๑๐ ถนนกำแพงเพชร ตำบล/แขวง จตุจักร เขตจตุจักร จังหวัดกรุงเทพมหานคร เมื่อวันที่ ๑๕ มกราคม ๒๕๖๗ ระหว่าง การรถไฟแห่งประเทศไทย โดย บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด ผู้รับมอบอำนาจ โดย นายศุภกร ยุทธวงษ์สุข ซึ่งต่อไปในสัญญานี้เรียกว่า "ผู้ซื้อ" ฝ่ายหนึ่ง กับ บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด ซึ่งจดทะเบียนเป็นนิติบุคคล ณ สำนักงานทะเบียนหุ้นส่วนบริษัทกลาง กรมพัฒนาธุรกิจการค้า กระทรวงพาณิชย์ มีสำนักงานใหญ่อยู่ เลขที่ ๑๗๕-๑๗๗ อาคารบางกอกสหประกันภัย ห้องที่ ๕ ชั้นที่ G ถนนสุรวงศ์ แขวงสุริยวงศ์ เขตบางรัก จังหวัดกรุงเทพมหานคร โดย นายพิพัฒน์ ประยูรทอง ผู้มีอำนาจลงนามผูกพันนิติบุคคลปรากฏตามหนังสือรับรองของ สำนักงานทะเบียนหุ้นส่วนบริษัทกลาง กรมพัฒนาธุรกิจการค้า กระทรวงพาณิชย์ ที่ E๑๐๐๙๑๒๒๐๕๘๓๒๗๗ ลงวันที่ ๑๘ ตุลาคม ๒๕๖๖ แนบท้ายสัญญานี้ ซึ่งต่อไปในสัญญานี้เรียกว่า "ผู้ขาย" อีกฝ่ายหนึ่ง

คู่สัญญาได้ตกลงกันมีข้อความดังต่อไปนี้

ข้อ ๑. ข้อตกลงซื้อขาย

ผู้ซื้อตกลงซื้อและผู้ขายตกลงขาย Relay สำหรับขบวนรถไฟฟ้า จำนวน ๙ รายการ โดยวิธีเฉพาะเจาะจง จำนวน ๙ (เก้า) รายการ เป็นราคาทั้งสิ้น ๓,๒๑๙,๖๓๐.๐๐ บาท (สามล้านสองแสนหนึ่งหมื่นเก้าพันหกร้อยสามสิบบาทถ้วน) ซึ่งได้รวมภาษีมูลค่าเพิ่ม จำนวน ๒๑๐,๖๓๐.๐๐ บาท (สองแสนหนึ่งหมื่นหกร้อยสามสิบบาทถ้วน) ตลอดจนภาษีอากรอื่นๆและค่าใช้จ่ายทั้งปวงด้วยแล้ว

ข้อ ๒. การรับรองคุณภาพ

ผู้ขายรับรองว่าสิ่งของที่ขายให้ตามสัญญานี้เป็นของแท้ ของใหม่ ไม่เคยใช้งานมาก่อน ไม่เป็นของเก่าเก็บ และมีคุณภาพ และคุณสมบัติไม่ต่ำกว่าที่กำหนดไว้ในเอกสารแนบท้ายสัญญาผนวก ๑ ถึง ๔

ในกรณีที่เป็นการซื้อสิ่งของซึ่งจะต้องมีการตรวจทดสอบ ผู้ขายรับรองว่า เมื่อตรวจทดสอบแล้วต้องมีคุณภาพและคุณสมบัติไม่ต่ำกว่าที่กำหนดไว้ตามสัญญานี้ด้วย

ข้อ ๓. เอกสารอันเป็นส่วนหนึ่งของสัญญา

เอกสารแนบท้ายสัญญาดังต่อไปนี้ ให้ถือเป็นส่วนหนึ่งของ สัญญานี้

๓.๑ ผนวก ๑ ขอบเขตของงาน จำนวน ๕๙ (ห้าสิบเก้า) หน้า

๓.๒ ผนวก ๒ ใบเสนอราคา จำนวน ๒ (สอง) หน้า

๓.๓ ผนวก ๓ ขอบเขตของงานของบริษัทฯ จำนวน ๓๒ (สามสิบสอง) หน้า

๓.๔ ผนวก ๔ หนังสือยืนยันราคา จำนวน ๑ (หนึ่ง) หน้า

ความใดในเอกสารแนบท้ายสัญญาที่ขัดหรือแย้งกับข้อความในสัญญานี้ ให้ใช้ข้อความในสัญญานี้บังคับ และในกรณีที่เอกสารแนบท้ายสัญญาขัดแย้งกันเอง ผู้ขายจะต้องปฏิบัติตามคำวินิจฉัยของผู้ซื้อ คำวินิจฉัยของผู้ซื้อให้ถือเป็นที่สุด และผู้ขายไม่มีสิทธิเรียกร้องราคา ค่าเสียหาย หรือค่าใช้จ่ายใดๆเพิ่มเติมจากผู้ซื้อทั้งสิ้น

ข้อ ๔. การส่งมอบ

ผู้ขายจะส่งมอบสิ่งของที่ซื้อขายตามสัญญาให้แก่ผู้ซื้อ ณ โรงซ่อมบำรุงหลักรถไฟฟ้า (สายสีแดง) (CT Depot) เลขที่ 1001 ถนนกำแพงเพชร 2 แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10900 ภายในวันที่.....๑๓ กรกฎาคม ๒๕๖๗.....ให้ถูกต้องและครบถ้วนตามที่กำหนดไว้ในข้อ ๑ แห่งสัญญานี้ พร้อมทั้งหีบห่อหรือเครื่องรัดพันผูกโดยเรียบร้อย

การส่งมอบสิ่งของตามสัญญานี้ ไม่ว่าจะเป็นการส่งมอบเพียงครั้งเดียว หรือส่งมอบหลายครั้ง ผู้ขายจะต้องแจ้งกำหนดเวลาส่งมอบแต่ละครั้งโดยทำเป็นหนังสือนำไปยื่นต่อผู้ซื้อ ณ บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด ณ สถานีกลางบางซื่อ ห้องแผนกจัดซื้อ ชั้น ๒ ในวันและเวลาทำการของผู้ซื้อ ก่อนวันส่งมอบไม่น้อยกว่า ๓ (สาม) วันทำการของผู้ซื้อ

ข้อ ๕. การตรวจรับ

เมื่อผู้ซื้อได้ตรวจรับสิ่งของที่ส่งมอบและเห็นว่าถูกต้องครบถ้วนตามสัญญาแล้ว ผู้ซื้อจะออกหลักฐานการรับมอบเป็นหนังสือไว้ให้ เพื่อผู้ขายนำมาเป็นหลักฐานประกอบการขอรับเงินค่าสิ่งของนั้น

ถ้าผลของการตรวจรับปรากฏว่าสิ่งของที่ผู้ขายส่งมอบไม่ตรงตามข้อ ๑ ผู้ซื้อทรงไว้ซึ่งสิทธิที่จะไม่รับสิ่งของนั้น ในกรณีเช่นว่านี้ ผู้ขายต้องรีบนำสิ่งของนั้นกลับคืนโดยเร็วที่สุดเท่าที่จะทำได้และนำสิ่งของมาส่งมอบให้ใหม่ หรือต้องทำการแก้ไขให้ถูกต้องตามสัญญาด้วยค่าใช้จ่ายของผู้ขายเอง และระยะเวลาที่เสียไปเพราะเหตุดังกล่าวผู้ขายจะนำมาอ้างเป็นเหตุขอขยายเวลาส่งมอบตามสัญญาหรือ ของดหรือลดค่าปรับไม่ได้

ต้นฉบับ

ข้อ ๖. การชำระเงิน

ผู้ซื้อตกลงชำระเงิน ค่าสิ่งของตามข้อ ๑ ให้แก่ผู้ขาย เมื่อผู้ซื้อได้รับมอบสิ่งของตามข้อ ๕ ไว้โดยครบถ้วนแล้ว

ข้อ ๗. การรับประกันความชำรุดบกพร่อง

ผู้ขายตกลงรับประกันความชำรุดบกพร่องหรือขัดข้องของสิ่งของตามสัญญานี้ เป็นเวลา ๑ (หนึ่ง) ปี นับถัดจากวันที่ผู้ซื้อได้รับมอบสิ่งของทั้งหมดไว้โดยถูกต้องครบถ้วนตามสัญญา โดยภายในกำหนดเวลาดังกล่าว หากสิ่งของตามสัญญานี้เกิดชำรุดบกพร่องหรือขัดข้องอันเนื่องมาจากการใช้งานตามปกติ ผู้ขายจะต้องจัดการซ่อมแซมหรือแก้ไขให้อยู่ในสภาพที่ใช้การได้ดีดังเดิม ภายใน ๓๐ (สามสิบ) วัน นับถัดจากวันที่ได้รับแจ้งจากผู้ซื้อโดยไม่คิดค่าใช้จ่ายใดๆ ทั้งสิ้น หากผู้ขายไม่จัดการซ่อมแซมหรือแก้ไขภายในกำหนดเวลาดังกล่าว ผู้ซื้อมีสิทธิที่จะทำการนั้นเองหรือจ้างผู้อื่นให้ทำการนั้นแทนผู้ขาย โดยผู้ขายต้องเป็นผู้ออกค่าใช้จ่ายเองทั้งสิ้น

ในกรณีเร่งด่วนจำเป็นต้องรีบแก้ไขเหตุชำรุดบกพร่องหรือขัดข้องโดยเร็ว และไม่อาจรอคอยให้ผู้ขายแก้ไขในระยะเวลาที่กำหนดไว้ตามวรรคหนึ่งได้ ผู้ซื้อมีสิทธิเข้าจัดการแก้ไขเหตุชำรุดบกพร่องหรือขัดข้องนั้นเอง หรือให้ผู้อื่นแก้ไขความชำรุดบกพร่องหรือขัดข้อง โดยผู้ขายต้องรับผิดชอบชำระค่าใช้จ่ายทั้งหมด

การที่ผู้ซื้อทำการนั้นเอง หรือให้ผู้อื่นทำการนั้นแทนผู้ขาย ไม่ทำให้ผู้ขายหลุดพ้นจากความรับผิดตามสัญญา หากผู้ขายไม่ชดใช้ค่าใช้จ่ายหรือค่าเสียหายตามที่ผู้ซื้อเรียกร้องผู้ซื้อมีสิทธิบังคับจากหลักประกันการปฏิบัติตามสัญญาได้

ข้อ ๘. หลักประกันการปฏิบัติตามสัญญา

ในขณะทำสัญญานี้ผู้ขายได้นำหลักประกันเป็น.....หนังสือค้ำประกันสัญญา..... เป็นจำนวนเงิน ๑๖๐,๙๘๒.๐๐ บาท (หนึ่งแสนหกหมื่นเก้าร้อยแปดสิบสองบาทถ้วน) ซึ่งเท่ากับร้อยละ ๕(ห้า) ของราคาทั้งหมดตามสัญญา มามอบให้แก่ผู้ซื้อเพื่อเป็นหลักประกันการปฏิบัติตามสัญญานี้

กรณีผู้ขายใช้หนังสือค้ำประกันมาเป็นหลักประกันการปฏิบัติตามสัญญา หนังสือค้ำประกันดังกล่าวจะต้องออกโดยธนาคารที่ประกอบกิจการในประเทศไทย หรือโดยบริษัทเงินทุนหรือบริษัทเงินทุนหลักทรัพย์ที่ได้รับอนุญาตให้ประกอบกิจการเงินทุนเพื่อการพาณิชย์และประกอบธุรกิจค้ำประกันตามประกาศของธนาคารแห่งประเทศไทย ตามรายชื่อบริษัทเงินทุนที่ธนาคารแห่งประเทศไทยแจ้งเวียนให้ทราบตามแบบที่คณะกรรมการนโยบายการจัดซื้อจัดจ้างและการบริหารพัสดุภาครัฐกำหนดหรืออาจเป็นหนังสือค้ำประกันอิเล็กทรอนิกส์ตามวิธีการที่กรมบัญชีกลางกำหนดก็ได้ และจะต้องมีอายุการค้ำประกันตลอดไปจนกว่าผู้ขายพ้นข้อผูกพันตามสัญญานี้

หลักประกันที่ผู้ขายนำมามอบให้ตามวรรคหนึ่ง จะต้องมีอายุครอบคลุมความรับผิดทั้งปวงของผู้ขายตลอดอายุสัญญานี้ ถ้าหลักประกันที่ผู้ขายนำมามอบให้ดังกล่าวลดลงหรือเสื่อมค่าลง หรือมีอายุไม่ครอบคลุมถึงความรับผิดของผู้ขายตลอดอายุสัญญา ไม่ว่าด้วยเหตุใดๆ ก็ตาม รวมถึงกรณีผู้ขายส่งมอบสิ่งของล่าช้าเป็นเหตุให้

ระยะเวลาส่งมอบหรือวันครบกำหนดความรับผิดในความชำรุดบกพร่องตามสัญญาเปลี่ยนแปลงไป ไม่ว่าจะเกิดขึ้นคราวใด ผู้ขายต้องหาหลักประกันใหม่หรือหลักประกันเพิ่มเติมให้มีจำนวนครบถ้วนตามวรรคหนึ่งมามอบให้แก่ผู้ซื้อภายใน .....(.....) วัน นับถัดจากวันที่ได้รับแจ้งเป็นหนังสือจากผู้ซื้อ

หลักประกันที่ผู้ขายนำมามอบไว้ตามข้อนี้ ผู้ซื้อจะคืนให้แก่ผู้ขาย โดยไม่มีดอกเบี้ยเมื่อผู้ขายพ้นจากข้อผูกพันและความรับผิดทั้งปวงตามสัญญานี้แล้ว

ข้อ ๙. การบอกเลิกสัญญา

ถ้าผู้ขายไม่ปฏิบัติตามสัญญาข้อใดข้อหนึ่ง หรือเมื่อครบกำหนดส่งมอบสิ่งของตามสัญญานี้แล้ว หากผู้ขายไม่ส่งมอบสิ่งของที่ตกลงขายให้แก่ผู้ซื้อหรือส่งมอบไม่ถูกต้อง หรือไม่ครบจำนวน ผู้ซื้อมีสิทธิบอกเลิกสัญญาทั้งหมดหรือแต่บางส่วนได้ การใช้สิทธิบอกเลิกสัญญานั้นไม่กระทบสิทธิของผู้ซื้อที่จะเรียกร้องค่าเสียหายจากผู้ขาย

ในกรณีที่ผู้ซื้อใช้สิทธิบอกเลิกสัญญา ผู้ซื้อมีสิทธิริบหรือบังคับจากหลักประกัน ตาม (ข้อ ๖ และ) ข้อ ๘ เป็นจำนวนเงินทั้งหมดหรือแต่บางส่วนก็ได้ แล้วแต่ผู้ซื้อจะเห็นสมควร และถ้าผู้ซื้อจัดซื้อสิ่งของจากบุคคลอื่นเต็มจำนวนหรือเฉพาะจำนวนที่ขาดส่ง แล้วแต่กรณี ภายในกำหนด ๓๐ (สามสิบ) วัน นับถัดจากวันบอกเลิกสัญญา ผู้ขายจะต้องชดใช้ราคาที่เพิ่มขึ้นจากราคาที่กำหนดไว้ในสัญญานี้ด้วย

ข้อ ๑๐. ค่าปรับ

ในกรณีที่ผู้ซื้อมิได้ใช้สิทธิบอกเลิกสัญญาตามข้อ ๙ ผู้ขายจะต้องชำระค่าปรับให้ผู้ซื้อเป็นรายวันในอัตราร้อยละ ๐.๒๐ (ศูนย์จุดสองศูนย์) ของราคาสิ่งของที่ยังไม่ได้รับมอบ นับถัดจากวันครบกำหนดตามสัญญาจนถึงวันที่ผู้ขายได้นำสิ่งของมาส่งมอบให้แก่ผู้ซื้อจนถูกต้องครบถ้วนตามสัญญา

การคิดค่าปรับในกรณีสิ่งของที่ตกลงซื้อขายประกอบกันเป็นชุด แต่ผู้ขายส่งมอบเพียงบางส่วน หรือขาดส่วนประกอบส่วนหนึ่งส่วนใดไปทำให้ไม่สามารถใช้การได้โดยสมบูรณ์ ให้ถือว่า ยังไม่ได้ส่งมอบสิ่งของนั้นเลย และให้คิดค่าปรับจากราคาสิ่งของเต็มทั้งชุด

ในระหว่างที่ผู้ซื้อยังมิได้ใช้สิทธิบอกเลิกสัญญานั้น หากผู้ซื้อเห็นว่าผู้ขายไม่อาจปฏิบัติตามสัญญาต่อไปได้ ผู้ซื้อจะใช้สิทธิบอกเลิกสัญญาและริบหรือบังคับจากหลักประกันตาม (ข้อ ๖ และ) ข้อ ๘ กับเรียกร้องให้ชดใช้ราคาที่เพิ่มขึ้นตามที่กำหนดไว้ในข้อ ๙ วรรคสองก็ได้ และถ้าผู้ซื้อได้แจ้งข้อเรียกร้องให้ชำระค่าปรับไปยังผู้ขายเมื่อครบกำหนดส่งมอบแล้ว ผู้ซื้อมีสิทธิที่จะปรับผู้ขายจนถึงวันบอกเลิกสัญญาได้อีกด้วย

ข้อ ๑๑. การบังคับค่าปรับ ค่าเสียหาย และค่าใช้จ่าย

ในกรณีที่ผู้ขายไม่ปฏิบัติตามสัญญาข้อใดข้อหนึ่งด้วยเหตุใดๆ ก็ตาม จนเป็นเหตุให้เกิดค่าปรับ ค่าเสียหาย หรือค่าใช้จ่ายแก่ผู้ซื้อ ผู้ขายต้องชดใช้ค่าปรับ ค่าเสียหาย หรือค่าใช้จ่ายดังกล่าวให้แก่ผู้ซื้อโดยสิ้นเชิงภายในกำหนด .....(.....) วัน นับถัดจากวันที่ได้รับแจ้งเป็นหนังสือจากผู้ซื้อ หากผู้ขายไม่ชดใช้ให้ถูกต้อง

ครบถ้วนภายในระยะเวลาดังกล่าวให้ผู้ซื้อมีสิทธิที่จะหักเอาจากจำนวนเงินค่าสิ่งของที่ซื้อขายที่ต้องชำระ หรือบังคับจากหลักประกันการปฏิบัติตามสัญญาได้ทันที

หากค่าปรับ ค่าเสียหาย หรือค่าใช้จ่ายที่บังคับจากเงินค่าสิ่งของที่ซื้อขายที่ต้องชำระ หรือหลักประกันการปฏิบัติตามสัญญาแล้วยังไม่เพียงพอ ผู้ขายยินยอมชำระส่วนที่เหลือที่ยังขาดอยู่ จนครบถ้วนตามจำนวนค่าปรับ ค่าเสียหาย หรือค่าใช้จ่ายนั้น ภายในกำหนด .....(.....) วัน นับถัดจากวันที่ได้รับแจ้งเป็นหนังสือจากผู้ซื้อ

หากมีเงินค่าสิ่งของที่ซื้อขายตามสัญญาที่หักไว้จ่ายเป็นค่าปรับ ค่าเสียหาย หรือค่าใช้จ่ายแล้วยังเหลืออยู่อีกเท่าใด ผู้ซื้อจะคืนให้แก่ผู้ขายทั้งหมด

ข้อ ๑๒. การงดหรือลดค่าปรับ หรือขยายเวลาส่งมอบ

ในกรณีที่มีเหตุเกิดจากความผิดหรือความบกพร่องของฝ่ายผู้ซื้อ หรือเหตุสุดวิสัย หรือเกิดจากพฤติการณ์อันหนึ่งอันใดที่ผู้ขายไม่ต้องรับผิดตามกฎหมาย หรือเหตุอื่นตามที่กำหนดในกฎกระทรวง ซึ่งออกตามความในกฎหมายว่าด้วยการจัดซื้อจัดจ้างและการบริหารพัสดุภาครัฐ ทำให้ผู้ขายไม่สามารถส่งมอบสิ่งของตามเงื่อนไขและกำหนดเวลาแห่งสัญญานี้ได้ ผู้ขายมีสิทธิของดหรือลดค่าปรับหรือขยายเวลาส่งมอบตามสัญญาได้ โดยจะต้องแจ้งเหตุหรือพฤติการณ์ดังกล่าวพร้อมหลักฐานเป็นหนังสือให้ผู้ซื้อทราบภายใน ๑๕ (สิบห้า) วัน นับถัดจากวันที่เหตุนั้นสิ้นสุดลง หรือตามที่กำหนดในกฎกระทรวงดังกล่าว

ถ้าผู้ขายไม่ปฏิบัติให้เป็นไปตามความในวรรคหนึ่ง ให้ถือว่าผู้ขายได้สละสิทธิเรียกร้องในการที่จะของดหรือลดค่าปรับหรือขยายเวลาส่งมอบตามสัญญา โดยไม่มีเงื่อนไขใดๆ ทั้งสิ้น เว้นแต่กรณีเหตุเกิดจากความผิดหรือความบกพร่องของฝ่ายผู้ซื้อซึ่งมีหลักฐานชัดแจ้งหรือผู้ซื้อทราบดีอยู่แล้วตั้งแต่ต้น

การงดหรือลดค่าปรับหรือขยายเวลาส่งมอบตามสัญญาตามวรรคหนึ่ง อยู่ในดุลพินิจของผู้ซื้อที่จะพิจารณาตามที่เห็นสมควร

ข้อ ๑๓. การใช้เรือไทย

ถ้าสิ่งของที่จะต้องส่งมอบให้แก่ผู้ซื้อตามสัญญานี้ เป็นสิ่งของที่ผู้ขายจะต้องสั่งหรือนำเข้ามาจากต่างประเทศ และสิ่งของนั้นต้องนำเข้ามาโดยทางเรือในเส้นทางเดินเรือที่มีเรือไทยเดินอยู่ และสามารถให้บริการรับขนได้ตามที่รัฐมนตรีว่าการกระทรวงคมนาคมประกาศกำหนด ผู้ขายต้องจัดการให้สิ่งของดังกล่าวบรรทุกโดยเรือไทยหรือเรือที่มีสิทธิเช่นเดียวกับเรือไทยจากต่างประเทศมายังประเทศไทย เว้นแต่จะได้รับอนุญาตจากกรมเจ้าท่าก่อนบรรทุกของนั้นลงเรืออื่นที่มิใช่เรือไทยหรือเป็นของที่รัฐมนตรีว่าการกระทรวงคมนาคมประกาศยกเว้นให้บรรทุกโดยเรืออื่นได้ ทั้งนี้ ไม่ว่าการสั่งหรือนำเข้าสิ่งของดังกล่าวจากต่างประเทศจะเป็นแบบใด

ต้นฉบับ

ในการส่งมอบสิ่งของตามสัญญาให้แก่ผู้ซื้อ ถ้าสิ่งของนั้นเป็นสิ่งของตามวรรคหนึ่ง ผู้ขายจะต้องส่งมอบใบตราส่ง (Bill of Lading) หรือสำเนาใบตราส่งสำหรับของนั้น ซึ่งแสดงว่าได้บรรทุกมาโดยเรือไทยหรือเรือที่มีสิทธิเช่นเดียวกับเรือไทยให้แก่ผู้ซื้อพร้อมกับการส่งมอบสิ่งของด้วย

ในกรณีที่สิ่งของดังกล่าวไม่ได้บรรทุกจากต่างประเทศมายังประเทศไทย โดยเรือไทยหรือเรือที่มีสิทธิเช่นเดียวกับเรือไทย ผู้ขายต้องส่งมอบหลักฐานซึ่งแสดงว่าได้รับอนุญาตจากกรมเจ้าท่า ให้บรรทุกของโดยเรืออื่นได้หรือหลักฐานซึ่งแสดงว่าได้ชำระค่าธรรมเนียมพิเศษเนื่องจากการไม่บรรทุกของโดยเรือไทยตามกฎหมายว่าด้วยการส่งเสริมการพาณิชยนาวีแล้วอย่างใดอย่างหนึ่งแก่ผู้ซื้อด้วย

ในกรณีที่ผู้ขายไม่ส่งมอบหลักฐานอย่างใดอย่างหนึ่งดังกล่าวในวรรคสองและวรรคสามให้แก่ผู้ซื้อ แต่จะขอส่งมอบสิ่งของดังกล่าวให้ผู้ซื้อก่อนโดยยังไม่รับชำระเงินค่าสิ่งของ ผู้ซื้อมีสิทธิรับสิ่งของดังกล่าวไว้ก่อนและชำระเงินค่าสิ่งของเมื่อผู้ขายได้ปฏิบัติถูกต้องครบถ้วนดังกล่าวแล้วได้

สัญญานี้ทำขึ้นเป็นสองฉบับ มีข้อความถูกต้องตรงกัน คู่สัญญาได้อ่านและเข้าใจข้อความโดยละเอียดตลอดแล้ว จึงได้ลงลายมือชื่อพร้อมทั้งประทับตรา (ถ้ามี) ไว้เป็นสำคัญต่อหน้าพยาน และคู่สัญญาต่างยึดถือไว้ฝ่ายละหนึ่งฉบับ

(ลงชื่อ).....ผู้ซื้อ

(นายศุภกร ยุทธวงษ์สุข)

(ลงชื่อ).....ผู้ขาย

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

(นายพัฒน์ ประยูรทอง)

(ลงชื่อ).....พยาน

(นางสาวจีราภรณ์ พงษ์ธานี)

(ลงชื่อ).....พยาน

(นายพิเชษฐ์ ประยูรทอง)

เลขที่โครงการ ๖๖๑๑๙๓๘๘๙๘๘

เลขคุมสัญญา ๖๖๑๒๐๑๐๐๕๑๗๐

ต้นฉบับ

SRTET
S.R.T. Electrified Train Company Limited

บันทึกข้อตกลงการรักษาความลับ

บันทึกข้อตกลงฉบับนี้ทำขึ้น ณ บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด เลขที่ ๑๐ อาคารสถานีกลางบางซื่อ ถนนกำแพงเพชร แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร เมื่อ ๑๕ มกราคม ๒๕๖๗ ระหว่าง บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด ผู้รับมอบอำนาจ โดย นายศุภกร ยุทธวงษ์สุข ซึ่งต่อไปนี้ในสัญญาเรียกว่า "ผู้รับสัญญา" ฝ่ายหนึ่ง กับ บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด ซึ่งจดทะเบียน เป็นนิติบุคคล ณ สำนักงานทะเบียนหุ้นส่วนบริษัทกลาง กรมพัฒนาธุรกิจการค้า กระทรวงพาณิชย์ มีสำนักงานใหญ่ อยู่เลขที่ ๑๗๕-๑๗๗ อาคารบางกอกสหประกันภัย ห้องเลขที่ ๕ ชั้นที่ G ถนน สุริยวงศ์ แขวง สุริยวงศ์ เขต บางรัก จังหวัด กรุงเทพมหานคร โดย นายพิพัฒน์ ประยูรทอง ผู้มีอำนาจลงนามผูกพันนิติบุคคลปรากฏ ตามหนังสือรับรองของ สำนักงานทะเบียนหุ้นส่วนบริษัทกลาง กรมพัฒนาธุรกิจการค้า กระทรวงพาณิชย์ที่ E๑๐๐๙๑๒๒๐๕๘๓๒๗๗ ลงวันที่ ๑๘ ตุลาคม ๒๕๖๖ แนบท้ายสัญญานี้ ซึ่งต่อไปนี้ในสัญญาเรียกว่า "**ผู้ให้สัญญา**" อีกฝ่ายหนึ่ง

ทั้งสองฝ่ายตกลงกันมีข้อความดังนี้

ข้อ ๑ ผู้ให้สัญญา ตกลงจะรักษาความลับเกี่ยวกับรายการ และ/หรือรายละเอียด และ/หรือภาพ และ/หรือข้อมูลใดๆ ที่เกี่ยวข้องกับบุคลากร การบัญชี การเงิน รายการสินค้า รายการทรัพย์สิน กระบวนการวิธีการ หรือขั้นตอนในการดำเนินการ ซื้อ Relay สำหรับขบวนรถไฟฟ้า จำนวน ๙ รายการ ตั้งแต่ขั้นตอนการเสนอและวางแผนระหว่างดำเนินการ จนสิ้นเสร็จการดำเนินการแล้วก็ตาม รวมถึงข้อมูลทั่วไปของ บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด (บริษัท รถไฟฟ้าฯ) รวมทั้งรายการที่ได้จัดทำขึ้นของบริษัทรถไฟฟ้าฯ ที่รับผิดชอบทั้งหมด อันจะส่งผลให้เกิด ความเสียหายกับ บริษัท รถไฟฟ้าฯ เว้นแต่ จะได้รับอนุญาตเป็นลายลักษณ์อักษรจาก บริษัท รถไฟฟ้าฯ แล้วเท่านั้น

ข้อ ๒ ผู้ให้สัญญา ตกลงจะปฏิบัติตามระเบียบต่างๆ ที่บริษัท รถไฟฟ้าฯกำหนด และ/หรือจะได้กำหนดขึ้นต่อไปในภายหน้าอย่างเคร่งครัด และหากผู้ให้สัญญาเปิดเผยข้อมูลตลอดจนเอกสารอันเป็นความลับของบริษัทรถไฟฟ้าฯ ดังกล่าวผู้ให้สัญญาต้องรับผิดชอบในความเสียหายที่เกิดขึ้น

ข้อ ๓ บันทึกข้อตกลงฉบับนี้มีผลใช้บังคับตั้งแต่วันที่ทั้งสองฝ่ายลงนามเป็นต้นไป บันทึกข้อตกลงฉบับนี้ทำขึ้นสองฉบับมีข้อความถูกต้องตรงกัน ทั้งสองฝ่ายได้อ่านและเข้าใจข้อความในข้อตกลงนี้ตลอดแล้ว จึงได้ลงลายมือชื่อพร้อมทั้งประทับตรา (ถ้ามี) ไว้เป็นสำคัญต่อหน้าพยานและต่างยึดถือไว้ฝ่ายละฉบับ

ลงชื่อ ..... ผู้รับสัญญา
(นายศุภกร ยุทธวงษ์สุข)

ลงชื่อ ..... ผู้ให้สัญญา
(นายพิพัฒน์ ประยูรทอง)

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

ลงชื่อ ..... พยาน
(นางสาวจีราภรณ์ พงษ์ธานี)

ลงชื่อ ..... พยาน
(นายพิเชษฐ์ ประยูรทอง)

ต้นฉบับ

ขอบเขตงาน

จัดหา Relay สำหรับขบวนรถไฟฟ้า

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๑. ความเป็นมา

ปัจจุบันอะไหล่ดังกล่าว ยังไม่มีอะไหล่สำรองคงคลังสำหรับการเบิก-จ่าย ในคลังพัสดุ ทางแผนกฯ จึงต้องจัดหามาให้เพียงพอต่อความต้องการใช้งาน ซึ่งอะไหล่ดังกล่าวอาจนำไปสู่ปัญหาที่ทำให้ขบวนรถไฟฟ้าต้องหยุดให้บริการได้ในอนาคต จึงต้องดำเนินการจัดหาใช้ในงานซ่อมบำรุงรถไฟฟ้าให้มีประสิทธิภาพเพิ่มมากขึ้น ตรงตามแผนการซ่อมบำรุงที่กำหนดไว้และเพื่อเป็นการเตรียมการรองรับงานซ่อมบำรุงที่จะเพิ่มขึ้นในอนาคต

๒. วัตถุประสงค์

๒.๑ เพื่อให้ขบวนรถไฟฟ้ามีความพร้อมใช้งาน

๒.๒ เพื่อจัดหาอะไหล่ให้มีความพร้อมใช้งานและสามารถดำเนินสัญญาต่อไปได้

๓. คุณสมบัติของผู้ยื่นข้อเสนอ

๓.๑. มีความสามารถตามกฎหมาย

๓.๒. ไม่เป็นบุคคลล้มละลาย

๓.๓. ไม่อยู่ระหว่างเลิกกิจการ

๓.๔. ไม่เป็นบุคคลซึ่งอยู่ระหว่างถูกระงับการยื่นข้อเสนอหรือทำสัญญากับหน่วยของรัฐไว้ชั่วคราว เนื่องจากเป็นผู้ที่ไม่ผ่านเกณฑ์การประเมินผลการปฏิบัติงานของผู้ประกอบการตามระบียบที่รัฐมนตรีว่าการกระทรวงการคลังกำหนดตามที่ประกาศเผยแพร่ในระบบเครือข่ายสารสนเทศของกรมบัญชีกลาง

๓.๕. ไม่เป็นบุคคลซึ่งถูกระบุชื่อไว้ในบัญชีรายชื่อผู้ทิ้งงานและได้แจ้งเวียนชื่อให้เป็นผู้ทิ้งงานของหน่วยงานของรัฐในระบบเครือข่ายสารสนเทศของกรมบัญชีกลาง ซึ่งรวมถึงนิติบุคคลที่ผู้ทิ้งงานเป็นหุ้นส่วนผู้จัดการ กรรมการผู้จัดการ ผู้บริหาร ผู้มีอำนาจในการดำเนินงานในกิจการของนิติบุคคลนั้นด้วย

๓.๖. มีคุณสมบัติและไม่มีลักษณะต้องห้ามอื่นตามที่คณะกรรมการนโยบายการจัดซื้อจัดจ้างและการบริหารพัสดุภาครัฐกำหนดในราชกิจจานุเบกษา

๓.๗. เป็นบุคคลธรรมดาหรือนิติบุคคลผู้มีอาชีพรับจ้างดังกล่าว

๓.๘. ไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้ยื่นข้อเสนอรายอื่นที่เข้ายื่นข้อเสนอให้แก่ รฟฟท. ณ วันยื่นข้อเสนอ หรือไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการซื้อครั้งนี้

๓.๙. ไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้ยื่นข้อเสนอได้มีคำสั่งให้สละเอกสิทธิ์และความคุ้มกันเช่นว่านั้น

๑).....(นายสุภชัย ภักดีศรี), ๒).....(นางนีรนุช อารีราชการัณย์), ๓).....(นางปฐพร ชนะพันธุ์)

๓.๑๐. ผู้ยื่นข้อเสนอต้องลงทะเบียนในระบบจัดซื้อจัดจ้างภาครัฐด้วยอิเล็กทรอนิกส์ (Electronic Government Procurement : e - GP) ของกรมบัญชีกลาง

๓.๑๑. ผู้ยื่นข้อเสนอซึ่งได้รับคัดเลือกเป็นคู่สัญญาต้องลงทะเบียนในระบบจัดซื้อจัดจ้างภาครัฐด้วยอิเล็กทรอนิกส์ (Electronic Government Procurement : e - GP) ของกรมบัญชีกลาง ตามคณะกรรมการ ป.ป.ช. กำหนด

๓.๑๒. ผู้ยื่นข้อเสนอต้องไม่อยู่ในฐานะเป็นผู้ไม่แสดงบัญชีรายรับรายจ่ายหรือแสดงบัญชีรายรับรายจ่ายไม่ถูกต้องครบถ้วนในสาระสำคัญ ตามที่คณะกรรมการ ป.ป.ช. กำหนด

๓.๑๓. ผู้ยื่นข้อเสนอซึ่งได้รับคัดเลือกเป็นคู่สัญญาต้องรับและจ่ายเงินผ่านบัญชีธนาคาร เว้นแต่การจ่ายเงินแต่ละครั้งซึ่งมีมูลค่าไม่เกินสามหมื่นบาทคู่สัญญาอาจจ่ายเป็นเงินสดก็ได้ ตามที่คณะกรรมการ ป.ป.ช. กำหนด

๓.๑๔. ผู้เสนอราคาต้องได้รับการแต่งตั้งให้เป็นตัวแทนจำหน่ายจากผู้ผลิตหรือตัวแทนจำหน่ายในประเทศไทยโดยให้ยื่นขณะเข้าเสนอราคา

๔. รูปแบบรายการคุณลักษณะเฉพาะ

๔.๑ Relay สำหรับขบวนรถไฟฟ้า จำนวน ๙ รายการ

๔.๑.๑. Plug in Instantaneous relay with Gold plated contacts จำนวน ๑๐ ชิ้น
- Type: D-U204E 110VDC
- Part No. 330213814

๔.๑.๒. Plug in Instantaneous relay จำนวน ๑๐ ชิ้น
- Type: D-U204 110VDC
- Part No. 330213803

๔.๑.๓. Plug in Instantaneous relay จำนวน ๑๐ ชิ้น
- Type: D-U201 24VDC
- Part No. 330213800

๔.๑.๔. Plug in Time Delay relay จำนวน ๑๐ ชิ้น
- Type: TDB4-U204-Q 0, 3-3min 110V
- Part No. 330650775

๔.๑.๕ Plug in Time Delay relay จำนวน ๑๐ ชิ้น
- Type: TDB4-U204-Q 0-30 min 110V
- Part No. 330652271

๑).....(นายสุภชัย ภักดีศรี), ๒).....(นางนีรนุช อารีราชการัณย์), ๓).....(นางปฐพร ขนะพันธุ์)

๔.๑.๖ Plug in Time Delay relay จำนวน ๑๐ ชิ้น

- Type: TDB4-U204-Q 0-30s 110V
- Part No. 330650752

๔.๑.๗ Plug in Time Delay relay จำนวน ๑๐ ชิ้น

- Type: TDB4-U204-Q 0-10s 110V
- Part No. 330652272

๔.๑.๘. Plug in Time Delay Off relay จำนวน ๑๐ ชิ้น

- Type: TDE4N-U 72-230VAC/DC 0-3s
- Part No. 330690049

๔.๑.๙. Plug in Flashing relay จำนวน ๑๐ ชิ้น

- Type: FDA4-U204-C 40imp/min 110 VDC code AX
- Part No. 331342074

๔.๓ ผลิตภัณฑ์ ยี่ห้อ Mors Smitt

๔.๒. รายละเอียดตามเอกสาร Technical Data Sheet จำนวน ๔ ฉบับ

๔.๓. อะไหล่ทุกรายการจะต้องเป็นของแท้ของใหม่หมดและจะต้องไม่เคยผ่านการใช้งานมาก่อน

๕. ระยะเวลาดำเนินการ

ราคาที่เสนอจะต้องเสนอกำหนดยืนราคาไม่น้อยกว่า ๖๐ วัน นับแต่วันยื่นขอเสนอ โดยภายในกำหนดยืนราคา ผู้ยื่นข้อเสนอต้องรับผิดชอบราคาที่ตนได้เสนอไว้ และจะถอนการเสนอไม่ได้

๖. ระยะเวลาส่งมอบงานหรือของพร้อมเงื่อนไขการชำระเงิน

๖.๑. ผู้ยื่นข้อเสนอจะต้องส่งมอบพัสดุไม่เกิน ๑๘๐ วัน นับถัดจากวันที่ลงนามในสัญญาซื้อขาย

๖.๒. สถานที่ส่งอบพัสดุ ณ บริษัท รถไฟฟ้า ร.ฟ.ท.จำกัด แผนกพัสดุ ศูนย์ซ่อมบำรุงระบบรถไฟฟ้าสายสีแดง เลขที่ ๑๐๐๑ ถ. กำแพงเพชร ๒ แขวงจตุจักร เขตจตุจักร กทม. ๑๐๙๐๐ โทร ๐๒-๔๘๑-๕๑๐๐ ต่อ ๔๒๗๔๕

๗. ระยะเวลาการรับประกัน

รับประกันความชำรุดบกพร่องของสิ่งของงานขื้อที่เกิดขึ้นภายในระยะเวลาไม่น้อยกว่า ๑ ปี นับถัดจากวันที่ รฟฟท. ได้รับมอบงาน โดยผู้ขายต้องรีบจัดการซ่อมแซมหรือแก้ไขให้ใช้การได้ดีดั่งเดิม ภายใน ๓๐ วัน นับถัดจากวันที่ได้รับแจ้งจากผู้ซื้อโดยไม่คิดค่าใช้จ่ายใดๆทั้งสิ้น

๘. อัตราค่าปรับ

คิดค่าปรับในอัตราร้อยละ ๐.๒ (ศูนย์จุดสองศูนย์) ของราคาสิ่งของที่ยังไม่ได้รับมอบ นับถัดจากวันครบกำหนดตามสัญญา

๑).....(นายสุภชัย ภักดีศรี) ๒).....(นางนีรนุช อารีราชการัณย์) ๓).....(นางปฐพร ชนะพันธุ์)

๙. กำหนดวันทำสัญญา

ผู้ชนะการเสนอราคาจะต้องทำสัญญากับ รฟฟท. ภายใน ๗ วัน นับถัดจากวันที่ได้รับแจ้ง

๑๐.เกณฑ์การพิจารณาผลการยื่นข้อเสนอ

ในการพิจารณาผลการยื่นข้อเสนอครั้งนี้ รฟฟท. จะพิจารณาตัดสินโดยใช้เกณฑ์ราคา โดยพิจารณาจากราคารวม

๑)..... ๒)..... ๓).....

(นายสุภชัย ภักดีศรี) (นางนีรนุช อารีราชการัณย์) (นางปฐพร ขนะพันธุ์)

ต้นฉบับ

รายการที่ 1 - 3

Mors Smitt
A Wabtec Company

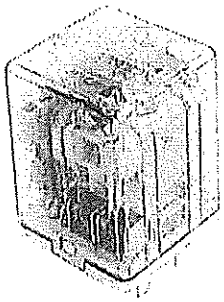
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

D-U200

Instantaneous relay

Part of D-platform



Features

- Instantaneous compact plug-in relay, 4 C/O contacts
- Integrated back EMF suppression diode
- Magnetic arc blow-out for high breaking capacity and long contact life
- Coil voltages 12 to 250 VDC
- Maximum continuous current 10 A
- Maximum switching voltage 250 VDC, 440 VAC
- High breaking capacity
- Minimum switching current 10 mA (optional 1 mA)
- Mechanical life 50 million operations
- Electrical life 10 million operations at 24 VDC, 0.5 A resistive load
- Integrated snaplock, no external retaining clip needed
- Transparent cover for easy visual inspection
- Flexibility with many options and wide range of sockets
- Optional positive mechanical keying relay to socket
- Fully railway compliant

Description

Plug-in railway relay with 4 change-over contacts. Standard equipped with a back EMF suppression diode and magnetic arc blow-out for high breaking capacity and long contact life. Proven reliable operation in switching high DC voltage / inductive loads and low currents. No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

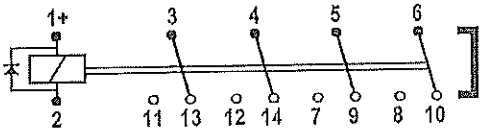
The construction of the relay and choice of materials makes the D-U200 relay suitable to withstand corrosive atmospheres, low and high temperatures, shock & vibrating and dry to very humid environments.

Compact design, choice of many options and a wide range of sockets makes the D-U200 relay an easy and flexible solution to use.

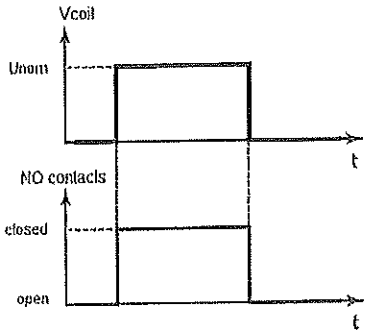
Application

Demanding rolling stock applications such as door control, traction control, braking systems etc. Designed for extreme reliability, within long endurance applications and harsh environments.

Connection diagram



Timing diagram



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	

CE (CCC) EAC

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A Wabtec Company

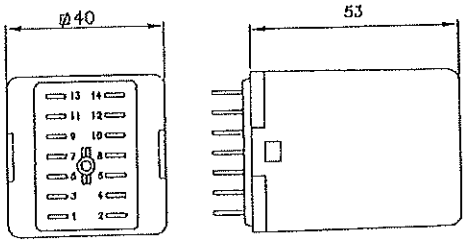
Instantaneous relay
D-U200

Options

- Weld-no-transfer contacts
- Low temperature (-50 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- LED coil indicator
- Bipolar LED indicator
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Polarisation diode
- Double zener diode
- Push-to-test button
- Coil for both AC and DC
- Double make / double break contacts (-50 °C)
- No diode
- Make before break contact
- Reversed polarity
- Keying

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface/Wall	35 mm rail	Panel/Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder lug	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Technical specifications

Instantaneous relay
D-U200

Coil characteristics

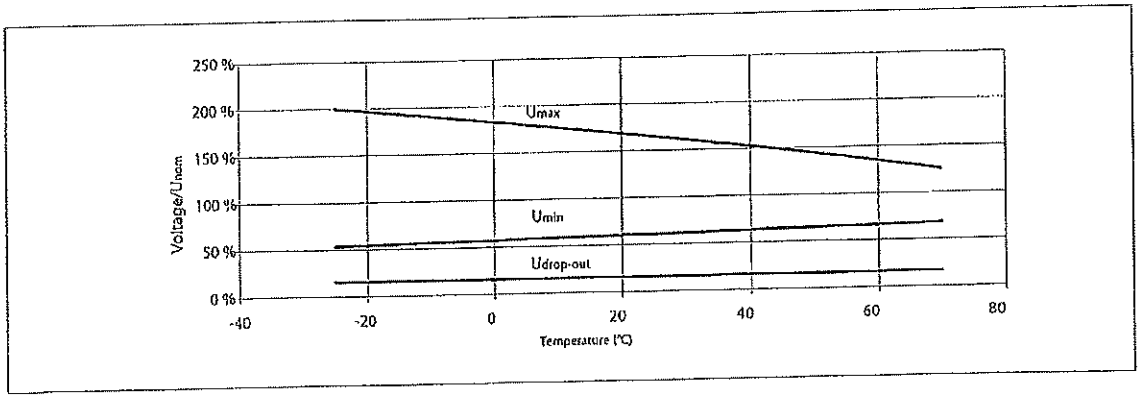
Inductance L/R at Unom (typical value): Energized Released	 11 ms 8 ms
Nominal power consumption	2.2 W @ Unom
Operating voltage range	0.7 - 1.25 Unom

Type	Unom (VDC)	Umin (VDC)	Umax (VDC)	Udrop-out (VDC)	Rcoil * (Ω)	Inom (mA)
D-U201	24	16.8	30	2.4	270	89
D-U202	48	33.6	60	4.8	1046	46
D-U203	72	50.4	90	7.2	2406	30
D-U204	110	77	137.5	11	5330	21
D-U205	96	67.2	120	9.6	4150	23
D-U206	12	8.4	15	1.2	72	167
D-U207	36	25.2	45	3.6	562	64
D-U208	55	38.5	69	5.5	1300	42
D-U210	120	84	150	12	6160	19
D-U213	125	87.5	156.25	12.5	7634	16
D-U215	220	154	275	22	21776	10
D-U220	250	175	312.5	25	23850	10

Other types on request
* The Rcoil is measured at room temperature and has a tolerance of ± 10%, with option L (LED) the value can differ

Remarks:
- Umin is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage
- Udrop-out is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation), in practice the relay drops out at a higher voltage
- Always select the nominal voltage as close as possible to the actual voltage in the application

Operating range at various temperatures



Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.

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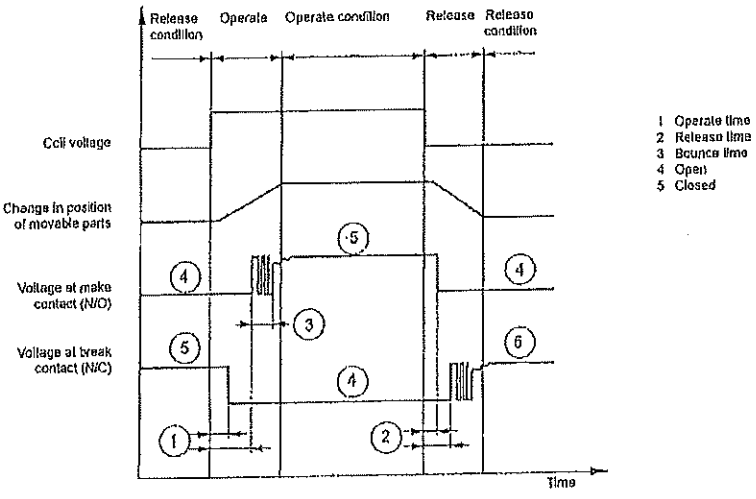
Instantaneous relay
D-U200

Contact characteristics

Amount and type of contacts		4 C/O
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min) 80 A (withstand > 10 x 80 A @ 200 ms, 1 min) 40 A (withstand > 10 x 40 A @ 500 ms, 1 min) 30 A (withstand > 10 x 30 A @ 1000 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Operating times (ms) at nominal voltage (typical value)	Standard relay	With double zener diode (option C)	With coil diode (Option Z)
Operate time	18	17	19
Release time	21	8	6
Bounce time N/O contacts	7	6	6
Bounce time N/C contacts	8	11	12



Electrical characteristics

Dielectric strength	Pole-pole	4 kV, 50 Hz, 1 min
	Cont-coil	2.5 kV, 50 Hz, 1 min
	Open contacts	2.5 kV, 50 Hz, 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)

Mechanical characteristics

Mechanical life	50 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	140 g (without options)

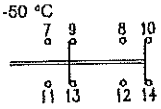
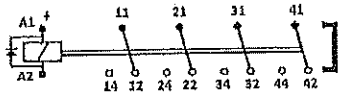
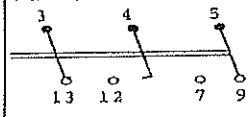
Environmental characteristics

Environmental	EN 50125-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+85 °C (optional: -50 °C)
Humidity	95% (condensation is permitted temporarily)
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

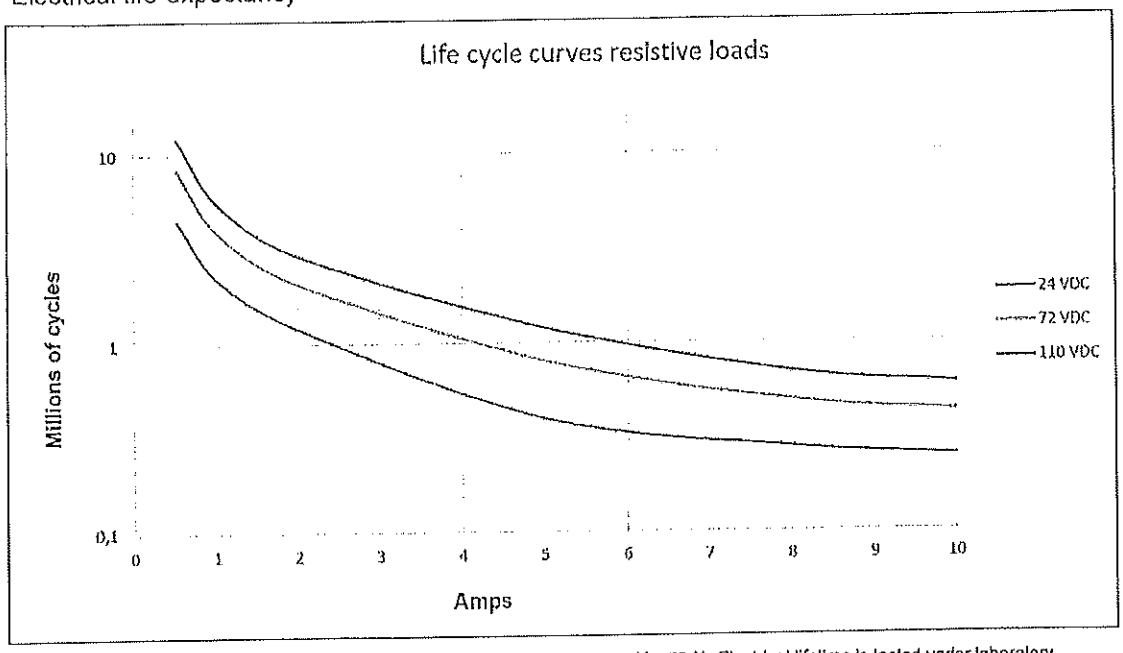
Options

Code	Description	Remark	Cannot be combined with
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification (option X6)	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PD1/PD2 and contact load > 0.5 A.	T
L	LED integrated in coil		X, X2
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Unom ≤ 120 V. Maximum allowed peak voltage 180 V, higher voltage will damage the diode. Replaces back EMF diode.	Z
W	Weld no transfer (see datasheet D-U200-W)		T, 11
Y	Double make/double break contacts	2 C/O DM/DB, -50 °C 	11
Z	No diode	Polarity independent	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E
P	Polarisation diode		X, Z
T	Push to test button		K, W
X	Bipolar LED	Only in combination with Q or Z	L, P, X2
X2	AC/DC rectifier bridge	Minimum nominal voltage 24 VDC	L, X
X6	Yellow tape around relay for identification		
X8	DIN marking	 Numbering relay bottom side standard (no DIN) marking	
11	Make before break contact	1 C/O 1 N/O 1 N/C  Contact 4-12 will make before contact 3-13 will break during pull-in. No make before break during drop-out.	W, Y

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

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Instantaneous relay
D-U200

Mounting possibilities/sockets

 V3	 V22BR	 V23	 V23BR	 V26
 V29	 V31	 V32	 V33	

Surface/wall mounting

338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting

338100100	V3	Solder lag socket, panel mount, rear connection
326400100	V26	Crimp contact socket, panel mount, rear connection, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm²)

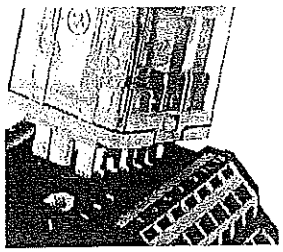
PCB mounting

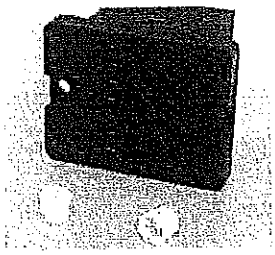
338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

Mechanical keying relay and socket (optional)



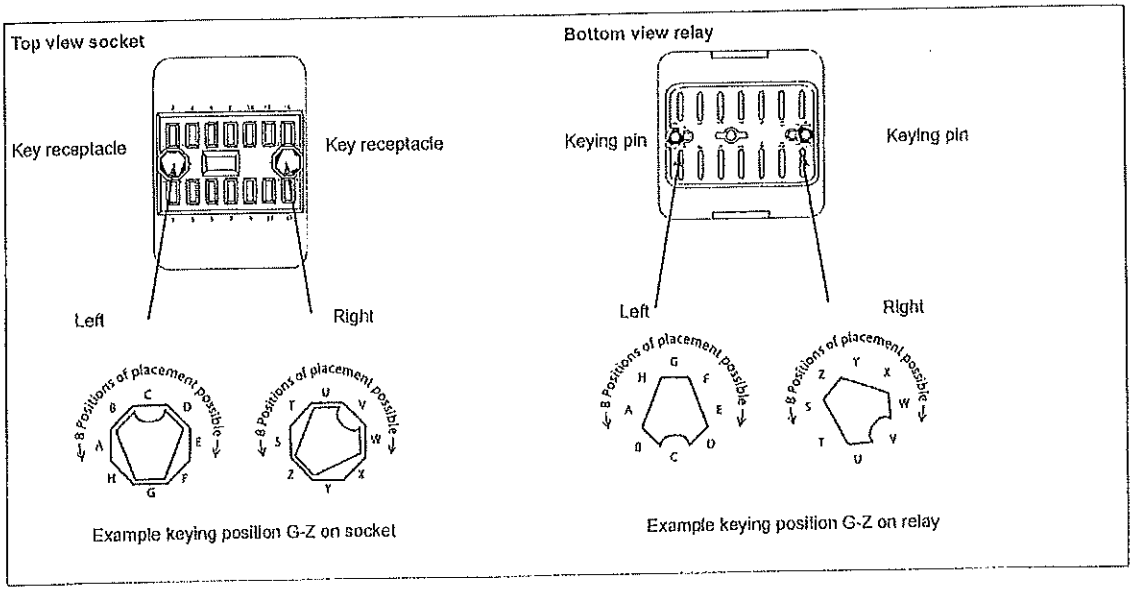


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



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Instantaneous relay
D-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

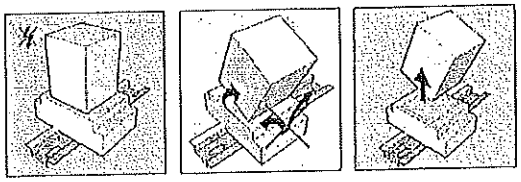
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

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Mors Smitt
A Wabtec Company

Instantaneous relay
D-U200

Ordering scheme

D-U2 [ ] - [ ] Code [ ]

Coil voltages	01	24 VDC	
	02	48 VDC	
	03	72 VDC	
	04	110 VDC	
	05	96 VDC	
	06	12 VDC	
	07	36 VDC	
	08	56 VDC	
	10	120 VDC	
	11	125 VDC	
	15	220 VDC	
	20	250 VDC	
Options (add as many options as needed)	C	Low temperature (-50 °C) - Max contact current 8 A	Cannot be combined with:
	E	Gold plated contacts	M
	K	Extra dust protection, IP50	T
	L	LED coil indicator	X, X2
	N	No magnetic arc blow-out	
	Q	Double zener diode	Z
	W013	Weld no transfer, 1 NC / 3 NO (see separate datasheet D-U200-W)	T, 11
	W022	Weld no transfer, 2 NC / 2 NO (see separate datasheet D-U200-W)	T, 11
	W031	Weld no transfer, 3 NC / 1 NO (see separate datasheet D-U200-W)	T, 11
	Y	Double make/ double break (-50 °C)	11
	Z	No diode	Q, P
Special options (minimum order quantity: 20)	M	AgSnO2 contacts, highly resistant to welding	E
	P	Polarisation diode	X, Z
	T	Push-to-test-button	K, W
	X	Bipolar LED	L, P, X2
	X2	Coil for both DC and AC	L, X
	X6	Yellow tape around relay for identification	
	X8	DIN marking	
	11	Make before break contact	W, Y

Keying code (optional, leave blank if not required)

Remark: keying codes are available for all possible coil voltages.

	Standard, silver contacts	
AS	24 VDC	D-U201 code AS
AY	36 VDC	D-U207 code AY
AT	48 VDC	D-U202 code AT
AU	72 VDC	D-U203 code AU
AV	110 VDC	D-U204 code AV
	Option E, gold contacts	
DT	24 VDC	D-U201-E code DT
FV	36 VDC	D-U207-E code FV
HU	48 VDC	D-U202-E code HU
AZ	72 VDC	D-U203-E code AZ
HV	110 VDC	D-U204-E code HV
	Option M, silver tin oxide contacts	
GT	24 VDC	D-U201-M code GT
HT	36 VDC	D-U207-M code HT
GU	48 VDC	D-U202-M code GU
GV	72 VDC	D-U203-M code GV
GW	110 VDC	D-U204-M code GW

Example: D-U204-CL code AV
Description: D-U200 relay, Unom: 110 VDC, low temperature (-50 °C), LED coil indicator, keying code AV

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Instantaneous relay
D-U200

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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ตามการที่ 3

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U201 24VDC	330213800	D-U201N 24VDC	to be defined
D-U201 24VDC code AS	330213788	D-U201N 24VDC code AS	to be defined
D-U201-C 24VDC	330213839	D-U201N 24VDC	to be defined
D-U201-C 24VDC code AS	330213771	D-U201N 24VDC code AS	to be defined
D-U201-CEK 24VDC	330213945	D-U201N-EK 24VDC	to be defined
D-U201-CEKL 24VDC	330214487	D-U201N-EKL 24VDC	to be defined
D-U201-CEKQ 24VDC	330213948	D-U201N-EKQ 24VDC	to be defined
D-U201-CEKQW013 24VDC	330214496	D-U201N-EKQW013 24VDC	to be defined
D-U201-CEKQW013 24VDC code DT	330214490	D-U201N-EKQW013 24VDC code DT	to be defined
D-U201-CEKQW022 24VDC	330214497	D-U201N-EKQW022 24VDC	to be defined
D-U201-CEQ 24VDC	330214349	D-U201N-EQ 24VDC	to be defined
D-U201-CK 24VDC	330214127	D-U201N-K 24VDC	to be defined
D-U201-CKLW013 24VDC	330214131	D-U201N-KLW013 24VDC	to be defined
D-U201-CKLW022 24VDC	330214133	D-U201N-KLW022 24VDC	to be defined
D-U201-CKQ 24VDC code AS	330214489	D-U201N-KQ 24VDC code AS	to be defined
D-U201-CL 24VDC	330213727	D-U201N-L 24VDC	to be defined
D-U201-CL 24VDC code AS	330214281	D-U201N-L 24VDC code AS	to be defined
D-U201-CLPQT 24VDC	330214108	D-U201N-LPQT 24VDC	to be defined
D-U201-CLQT 24VDC	330213992	D-U201N-LQT 24VDC	to be defined
D-U201-CLT 24VDC	330214014	D-U201N-LT 24VDC	to be defined
D-U201-CLW013 24VDC code AS	330214339	D-U201N-LW013 24VDC code AS	to be defined
D-U201-CMW013 24VDC	330214249	D-U201N-MW013 24VDC	to be defined
D-U201-CMW022 24VDC	330214266	D-U201N-MW022 24VDC	to be defined
D-U201-CQ 24VDC	330213958	D-U201N-Q 24VDC	to be defined
D-U201-CW013 24VDC	330214067	D-U201N-W013 24VDC	to be defined
D-U201-CW022 24VDC code AS	330214078	D-U201N-W022 24VDC code AS	to be defined
D-U201-E 24VDC	330213821	D-U201N-E 24VDC	to be defined
D-U201-E 24VDC code DT	330214081	D-U201N-E 24VDC code DT	to be defined
D-U201-EK 24VDC	330213799	D-U201N-EK 24VDC	to be defined
D-U201-EK 24VDC code DT	330213798	D-U201N-EK 24VDC code DT	to be defined
D-U201-EKL 24VDC	330213774	D-U201N-EKL 24VDC	to be defined
D-U201-EKQ 24VDC	330213720	D-U201N-EKQ 24VDC	to be defined
D-U201-EL 24VDC	330213831	D-U201N-EL 24VDC	to be defined
D-U201-EL 24VDC code AS	330213947	D-U201N-EL 24VDC code AS	to be defined
D-U201-EL 24VDC code DT	330214160	D-U201N-EL 24VDC code DT	to be defined

หน้าที่ 2

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U203-CLQ 72VDC code AU	330214114	D-U203N-LQ 72VDC code AU	to be defined
D-U203-CM 72VDC code AZ	330214011	D-U203N-M 72VDC code AZ	to be defined
D-U203-CQ 72VDC	330213708	D-U203N-Q 72VDC	to be defined
D-U203-E 72VDC	330213809	D-U203N-E 72VDC	to be defined
D-U203-E 72VDC code AZ	330213895	D-U203N-E 72VDC code AZ	to be defined
D-U203-EK 72VDC	330213873	D-U203N-EK 72VDC	to be defined
D-U203-EKL 72 VDC	330214384	D-U203N-EKL 72 VDC	to be defined
D-U203-EL 72VDC	330213941	D-U203N-EL 72VDC	to be defined
D-U203-EQL 72VDC	330213991	D-U203N-ELQ 72VDC	to be defined
D-U203-KLC 72VDC	330213944	D-U203N-KL 72VDC	to be defined
D-U203-KMPQ 72VDC code GV	330214423	D-U203N-KMPQ 72VDC code GV	to be defined
D-U203-L 72VDC	330213825	D-U203N-L 72VDC	to be defined
D-U203-LQ 72VDC	330214334	D-U203N-LQ 72VDC	to be defined
D-U203-LQ 72VDC code AU	330214260	D-U203N-LQ 72VDC code AU	to be defined
D-U203-LW013 72VDC code AU	330214354	D-U203N-LW013 72VDC code AU	to be defined
D-U203-M 72VDC	330213733	D-U203N-M 72VDC	to be defined
D-U203-Q 72VDC	330213846	D-U203N-Q 72VDC	to be defined
D-U203-Q 72VDC code AU	330213615	D-U203N-Q 72VDC code AU	to be defined
D-U203-QL 72VDC	330213744	D-U203N-LQ 72VDC	to be defined
D-U203-W022 72VDC code AU	330214037	D-U203N-W022 72VDC code AU	to be defined
D-U203-Z 72VDC code AU	330214101	D-U203N-Z 72VDC code AU	to be defined
D-U203-ZW013 72VDC code AU	330214100	D-U203N-W013Z 72VDC code AU	to be defined
D-U203-ZW022 72VDC code AU	330214102	D-U203N-ZW022 72VDC code AU	to be defined
D-U204 110VDC	330213803	D-U204N 110VDC	to be defined
D-U204 110VDC code AV	330213787	D-U204N 110VDC code AV	to be defined
D-U204-C 110VDC	330213830	D-U204N 110VDC	to be defined
D-U204-C 110VDC code AV	330213746	D-U204N 110VDC code AV	to be defined
D-U204-CEKLW022 110VDC	330214424	D-U204N-EKLW022 110VDC	to be defined
D-U204-CEL 110VDC code HV	330214499	D-U204N-EL 110VDC code HV	to be defined
D-U204-CKL 110VDC code AV	330214404	D-U204N-KL 110VDC code AV	to be defined
D-U204-CKLW013 110VDC	330214130	D-U204N-KLW013 110VDC	to be defined
D-U204-CKLW022 110VDC	330214132	D-U204N-KLW022 110VDC	to be defined
D-U204-CKLX6 110VDC	330213584	D-U204N-KL 110VDC	to be defined
D-U204-CKMPW031 110VDC	330214342	D-U204N-KMPW031 110VDC	to be defined
D-U204-CKMPW031 110VDC code GW	330213596	D-U204N-KMPW031 110VDC code GW	to be defined

รายการที่ ๒

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U204-CL 110VDC	330213725	D-U204N-L 110VDC	to be defined
D-U204-CL 110VDc code AV	330214134	D-U204N-L 110VDC code AV	to be defined
D-U204-CLT 110VDC	330213713	D-U204N-LT 110VDC	to be defined
D-U204-CLT 110VDC code AV	330214427	D-U204N-LT 110VDC code AV	to be defined
D-U204-CLW013 110VDC	330214188	D-U204N-LW013 110VDC	to be defined
D-U204-CPW022 110VDC code AV	330214096	D-U204N-PW022 110VDC code AV	to be defined
D-U204-CQ 110VDC	330213980	D-U204N-Q 110VDC	to be defined
D-U204-CW013 110VDC	330214075	D-U204N-W013 110VDC	to be defined
D-U204-CW013 110VDC code AV	330214386	D-U204N-W013 110VDC code AV	to be defined
D-U204-CW022 110VDC	330214126	D-U204N-W022 110VDC	to be defined
D-U204-CW022 110VDC code AV	330214344	D-U204N-W022 110VDC code AV	to be defined
D-U204-CW031 110VDC code AV	330214387	D-U204N-W031 110VDC code AV	to be defined
D-U204-E 110VDC	330213814	D-U204N-E 110VDC	to be defined
D-U204-E 110VDC code AW	330214051	D-U204N-E 110VDC code AW	to be defined
D-U204-EKLQW022 110VDC code HV	330214350	D-U204N-EKLQW022 110VDC code HV	to be defined
D-U204-EKLW031 110VDC code HV	330214378	D-U204N-EKLW031 110VDC code HV	to be defined
D-U204-EKQ 110VDC	330213884	D-U204N-EKQ 110VDC	to be defined
D-U204-EL 110VDC	330213792	D-U204N-EL 110VDC	to be defined
D-U204-ELK 110VDC	330213979	D-U204N-EKL 110VDC	to be defined
D-U204-ELK 110VDC code HV	330214095	D-U204N-EKL 110VDC code HV	to be defined
D-U204-ELW022 110VDC code HV	330214089	D-U204N-ELW022 110VDC code HV	to be defined
D-U204-ELZ 110VDC	330214265	D-U204N-ELZ 110VDC	to be defined
D-U204-EQ 110VDC	330214015	D-U204N-EQ 110VDC	to be defined
D-U204-EQ 110VDC code HV	330214094	D-U204N-EQ 110VDC code HV	to be defined
D-U204-EQW013 110VDC code HV	330214277	D-U204N-EQW013 110VDC code HV	to be defined
D-U204-EQW022 110VDC code HV	330214279	D-U204N-EQW022 110VDC code HV	to be defined
D-U204-EQW031 110VDC code HV	330214122	D-U204N-EQW031 110VDC code HV	to be defined
D-U204-EW013 110VDC	330214137	D-U204N-EW013 110VDC	to be defined
D-U204-EW022 110VDC	330214371	D-U204N-EW022 110VDC	to be defined
D-U204-EW022 110VDC code HV	330214157	D-U204N-EW022 110VDC code HV	to be defined
D-U204-KC 110VDC	330213897	D-U204N-K 110VDC	to be defined
D-U204-KL 110VDC	330213786	D-U204N-KL 110VDC	to be defined
D-U204-KLC 110VDC	330213602	D-U204N-KL 110VDC	to be defined
D-U204-KLCE 110VDC	330214345	D-U204N-EKL 110VDC	to be defined
D-U204-KLCM 110VDC	330213990	D-U204N-KLM 110VDC	to be defined

ตารางที่ 1

ต้นฉบับ

มยสารที่ 4-7

Mors Smitt
A Wabtec Company

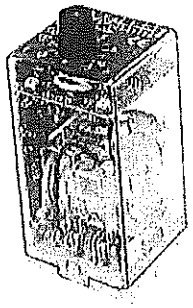
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

TDB4-U200

Timer relay

Part of D-platform



Description

Plug-in electronic railway timer relay with four change-over contacts. When the relay is activated there is a delay on pull-in. The delay time is adjustable with a lockable knob. The relay can also be supplied with a fixed time delay (no knob).

The relay is equipped with two LEDs which indicate the presence of power supply and the energizing of the coil. Also standard equipped with magnetic arc blow-out for high breaking capacity and long contact life.

The construction of the relay and choice of materials makes the TDB4-U200 relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments.

No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

Compact design, choice of many options and a wide range of sockets makes the TDB4-U200 relay an easy and flexible solution to use

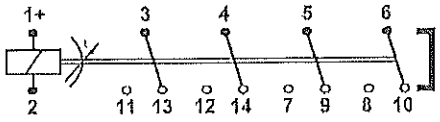
Application

These relays are designed for demanding rolling stock applications. The TDB4-U200 is used in applications where a time delay is necessary after activating the relay.

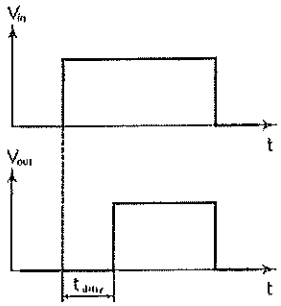
Features

- Time delay relay, delay on pull-in
- Compact plug-in design
- 4 C/O contacts
- Delay time adjustable with a lockable knob
- Also available with fixed time delay
- Magnetic arc blow-out
- Two LEDs for status indication
- Flat, square and silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock
- Transparent cover
- Optional positive mechanical keying relay to socket

Connection diagram



Timing diagram



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	IEC 60947-5-4

ต้นฉบับ

Mors Smitt
A Wabtec Company

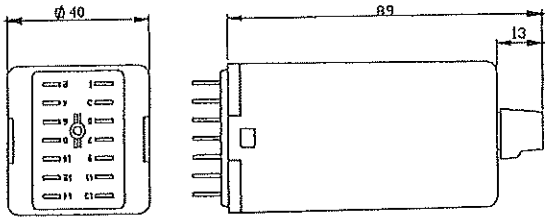
Timer relay
TDB4-U200

Options

- Low temperature (-40 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode
- Double make/double break contacts

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface/Wall	Rail (mm/in)	Panel/Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Technical specifications

Time delay characteristics

Time delay function Available time ranges, adjustable (xx)	Delay on pull-in 0.1...1 s 1...10 s 0.3...3 min 3...30 min	0.3...3 s 3...30 s 0.6...6 min 6...60 min	0.6...6 s 6...60 s 1...10 min
Accuracy - adjustment	<10 % of full scale After adjusting/fixed time setting: no variation in setpoint		
Accuracy - repeatability	< 0.5 %		
Time variation vs voltage variation vs. temperature variation	± 0.05 % / % U_{nom} ± 0.02 % / K		
Pull-in time	Depending on pull-in time setting (xx)		
Recovery time	± 0.1%		
Release time	< 30 ms		
Maximum permissible ripple	50 %		

Example time delay : Time range 0.3...3 s
Time delay set on 2 s : delay will be between 1.7 s...2.3 s
For example: 2.0 s. The ambient temperature is 40 degrees Celsius which is 20 degrees different compared to the standard 20 degrees Celsius. This results in 0.4 % extra time variation. The applied voltage is 30% lower than the nominal voltage. This results in 1.5 % extra time variation. The total maximum time variation is then 0.5 % (repeatability) + 0.4 % (temperature variation) + 1.5 % (voltage variation) = 2.4 %. In this case every new pulse will be between 1.95 s and 2.05 s.

Coil characteristics

Operating voltage range		0.7...1.25 U_{nom}
Nominal power consumption	During time delay	< 0.875 W (220 V) < 0.375 W (110 V) Lower voltage = lower power
	After time delay	< 3.6 W (220 V) < 3 W (110 V) Lower voltage = lower power

Type	U_{nom} (VDC)	U_{min} (VDC)	U_{max} (VDC)	$U_{drop-out}$ (VDC)
TDB4-U201-xx	24	16.8	30	2.4
TDB4-U202-xx	48	33.6	60	4.8
TDB4-U203-xx	72	50.4	90	7.2
TDB4-U204-xx	110	77.0	138	11.0
TDB4-U205-xx	96	67.2	120	9.6
TDB4-U207-xx	36	25.2	45	3.6

Other types on request

Remarks:
- Umin is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage
- Udrop-out is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation), in practice the relay drops out at a higher voltage (Urelease)
- To reset the time function, the voltage must drop below Udrop-out
- Always select the nominal voltage as close as possible to the actual voltage in the application

ต้นฉบับ

Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Contact characteristics

Amount and type of contacts		4 C/O
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min) 80 A (withstand > 10 x 80 A @ 200 ms, 1 min) 40 A (withstand > 10 x 40 A @ 500 ms, 1 min) 30 A (withstand > 10 x 30 A @ 1000 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	IEC 60255-5	Pole-pole	4 kV, 50 Hz, 1 min
	IEC 60077	Cont-coil	2.5 kV, 50 Hz, 1 min
		Open contacts	2.5 kV; 50 Hz; 1 min
Pulse withstanding		IEC 60255-5	5 kV (1.2/50 µs)
EMC			EN 50121-3-2 compliant

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Torque value screw to lock knob	0.2-0.4 Nm
Weight	180 g (without options)

Environmental characteristics

Environmental	EN 50125-1 and IEC 60077-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (optional: -40 °C)
Humidity	93%
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class 4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2
Insulation materials	Cover: polycarbonate Base: polyester

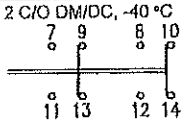
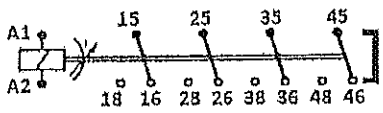
Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

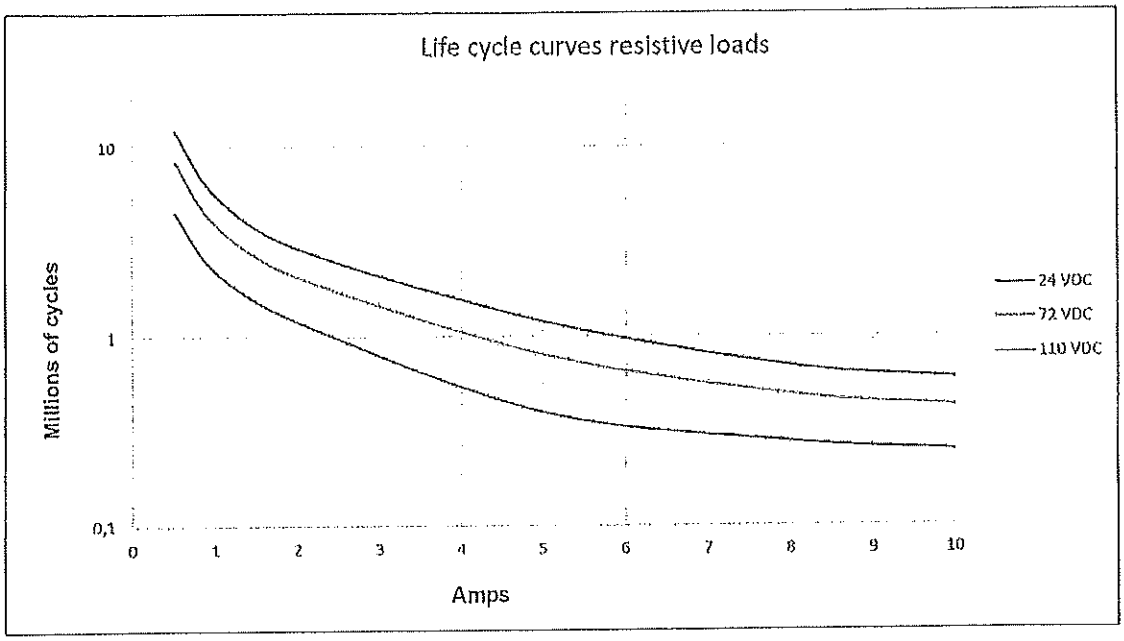
Options

Code	Description	Remark	Cannot be combined with
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)		M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket, Application PD1/PD2 and contact load > 0.5 A.	
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Maximum allowed peak voltage 180 V, higher voltage will damage the diode	
Y	Double make/double break contacts	2 C/O DM/DC, -40 °C 	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E
X8	DIN marking	 Numbering relay bottom side standard (no DIN) marking	

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

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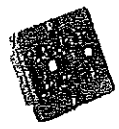
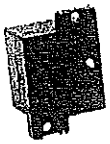
Timer relay
TDB4-U200

Mounting possibilities/sockets

 V3	 V22BR	 V23	 V23BR	 V26
 V29	 V31	 V32	 V33	

Surface/wall mounting

338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting

338100100	V3	Solder tag socket, panel mount, rear connection
326400100	V26	Crimp contact socket, panel mount, rear connection, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000670	V33	Push-in terminal socket, panel mount, rear dual connection (3.3 mm²)

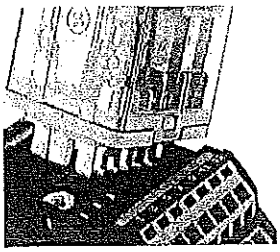
PCB mounting

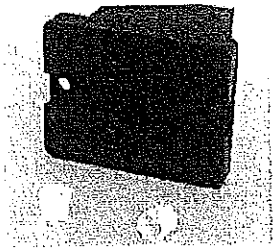
338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

Mechanical keying relay and socket (optional)



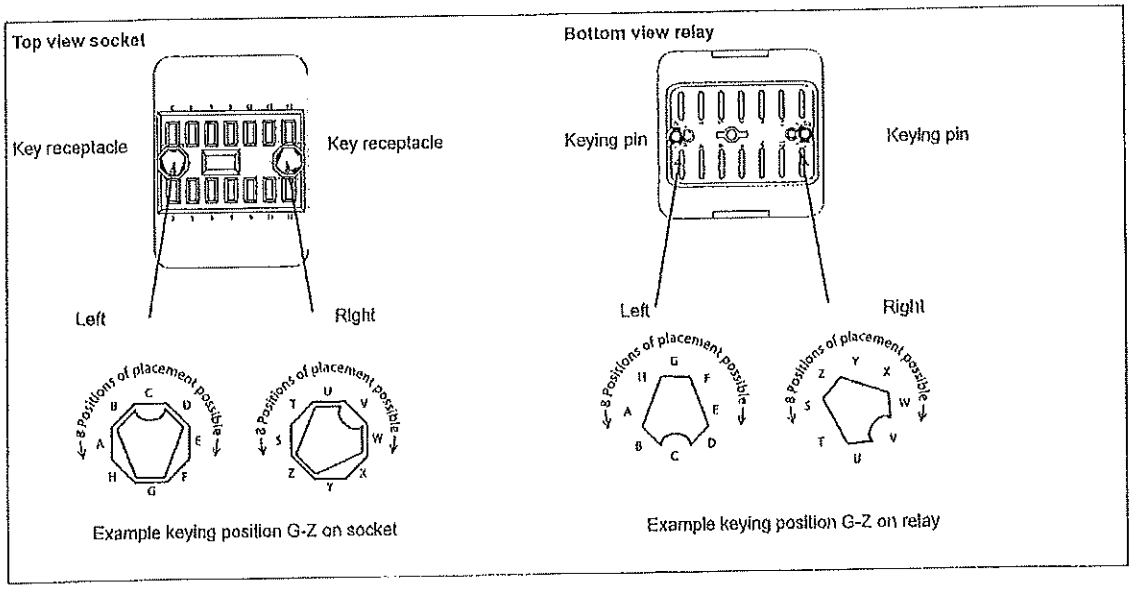


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

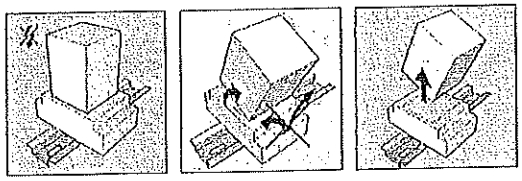
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail. Torque value screw to lock knob: 0.2-0.4 Nm

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Ordering scheme

TDB4-U [ ] - [ ] [ ]

Coil voltages	201		24 VDC	
	207		66 VDC	
	202		48 VDC	
	203		72 VDC	
	205		96 VDC	
	204		110 VDC	
Options (add as many options as needed)		C	Low temperature (-40 °C) - Max contact current 8 A	
		E	Gold plated contacts	M
		K	Extra dust protection, IP50	T
		N	No magnetic arc blow-out	
		Q	Double zener diode	
		Y	Double make/double break (CY -40 °C)	
Special options (minimum order quantity: 20)		M	$AgSnO_2$ contacts, highly resistant to welding	E
		X6	Din marking	
Time ranges Delay-on and Delay-off	0.1...1 s			
	0.3...3 s			
	0.6...6 s			
	1...10 s			
	3...30 s			
	6...60 s			
	0.3...3 min			
	0.6...6 min			
	1...10 min			
	3...30 min			
	6...60 min			
	fixed		No knob	

Examples:

TDB4-U204-C 1-10 s
Description: TDB4-U204 relay, Unom 110 VDC, low temperature (-40 °C), with time range 1...10 s

Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Classic product Description TDB4-U200 series	Part number U200 series	New product Description TDB4-U200N series	Part number U200N series
TDB4-U204-E 0-10s (4s) 110VDC	330652267	TDB4-U204N-ELr 0-10s (4s) 110VDC	To be defined
TDB4-U204-E 0-30s 110 V	330650757	TDB4-U204N-ELr 0-30s 110VDC	To be defined
TDB4-U204-E 0-30s (15s) 110VDC	330652206	TDB4-U204N-ELr 0-30s (15s) 110VDC	To be defined
TDB4-U204-E 0-30s (3s)110 V	330652270	TDB4-U204N-ELr 0-30s (3s) 110VDC	To be defined
TDB4-U204-E 0-60min (45min)110 V	330652287	TDB4-U204N-ELr 0-60min (45min) 110VDC	To be defined
TDB4-U204-E 0-10s (6s) 110VDC	330652259	TDB4-U204N-ELr 0-10s (6s) 110VDC	To be defined
TDB4-U204-N 0-30min (15min)110V	330650784	TDB4-U204N-Lr 0-30min (15min) 110VDC	To be defined
TDB4-U204-EK 0,3-3s (1s) 110VDC	330652278	TDB4-U204N-EKLr 0-3s (1s) 110VDC	To be defined
TDB4-U204-EK 0-60min (45min) 110VDC	330652277	TDB4-U204N-EKLr 0-60min (45min) 110VDC	To be defined
TDB4-U204-EQ 0-10s 110 V	330650765	TDB4-U204N-ELrQ 0-10s 110VDC	To be defined
TDB4-U204-K 10s 110 V	330650785	TDB4-U204N-KLr 10s 110VDC	To be defined
TDB4-U204-K 2,5s 110 V	330650763	TDB4-U204N-KLr 2,5s 110VDC	To be defined
TDB4-U204-C 0,3-3s (1,8s) 110V	330652248	TDB4-U204N-Lr 0-3s (1,8s) 110VDC	To be defined
TDB4-U204-C 0,3-3s (2s) 110V	330652279	TDB4-U204N-Lr 0-3s (2s) 110VDC	To be defined
TDB4-U204-KC 1s 110 V	330650798	TDB4-U204N-KLr 1s 110VDC	To be defined
TDB4-U204-KC 2s 110 V	330650799	TDB4-U204N-KLr 2s 110VDC	To be defined
TDB4-U204-KC 5min 110 V	330652202	TDB4-U204N-KLr 5min 110VDC	To be defined
TDB4-U204-KC 6s 110 V	330652200	TDB4-U204N-KLr 6s 110VDC	To be defined
TDB4-U204-KC 10s 110 V	330652207	TDB4-U204N-KLr 10s 110VDC	To be defined
TDB4-U204-KC 20s 110 V	330652231	TDB4-U204N-KLr 20s 110VDC	To be defined
TDB4-U204-KC 30s 110 V	330652201	TDB4-U204N-KLr 30s 110VDC	To be defined
TDB4-U204-C 0,3-3s 110V	330213657	TDB4-U204N-Lr 0-3s 110VDC	To be defined
TDB4-U204-C 0-60s (10s) 110V	330650815	TDB4-U204N-Lr 0-60s (10s) 110VDC	To be defined
TDB4-U204-KCE 0,6s 110 V	330652223	TDB4-U204N-EKLr 0,6s 110VDC	To be defined
TDB4-U204-KE 10s 110VDC	330652265	TDB4-U204N-EKLr 10s 110VDC	To be defined
TDB4-U204-KE 2s 110VDC	330652276	TDB4-U204N-EKLr 2s 110VDC	To be defined
TDB4-U204-C 0-60s (40s) 110V	330652243	TDB4-U204N-Lr 0-60s (40s) 110VDC	To be defined
TDB4-U204-M 0-10s 110 V	330652225	TDB4-U204N-LrM 0-10s 110VDC	To be defined
TDB4-U204-MY 3s 110VDC code GW	330652245	TDB4-U204N-LrMY 3s 110VDC code GW	To be defined
TDB4-U204-C 0,6-6s (2,5s) 110V	330652253	TDB4-U204N-Lr 0-6s (2,5s) 110VDC	To be defined
TDB4-U204-C 0,6-6s (5s) 110V	330651751	TDB4-U204N-Lr 0-6s (5s) 110VDC	To be defined
TDB4-U204-Q 2s 110 V	330650754	TDB4-U204N-LrQ 2s 110VDC	To be defined
TDB4-U204-Q 3s 110 V	330650773	TDB4-U204N-LrQ 3s 110VDC	To be defined
TDB4-U204-Q 6s 110 V	330650769	TDB4-U204N-LrQ 6s 110VDC	To be defined
TDB4-U204-Q 15s 110 V	330650770	TDB4-U204N-LrQ 15s 110VDC	To be defined
TDB4-U204-Q 0,3-3min 110 V	330650775	TDB4-U204N-LrQ 0-3min 110VDC	To be defined

รายการที่ 4

รายการที่ 7

รายการที่ 5

รายการที่ 6

Classic product		New product	
Description TDB4-U200 series	Part number U200 series	Description TDB4-U200N series	Part number U200N series
TDB4-U204-Q 0,3-3s 110 V	330650811	TDB4-U204N-LrQ 0-3s 110VDC	To be defined
TDB4-U204-Q 0,6-6s 110 V	330650751	TDB4-U204N-LrQ 0-6s 110VDC	To be defined
TDB4-U204-Q 0-10s 110 V	330652272	TDB4-U204N-LrQ 0-10s 110VDC	To be defined
TDB4-U204-Q 0-10min 110 V	330650812	TDB4-U204N-LrQ 0-10min 110VDC	To be defined
TDB4-U204-Q 0-30min 110 V	330652271	TDB4-U204N-LrQ 0-30min 110VDC	To be defined
TDB4-U204-Q 0-30s 110 V	330650752	TDB4-U204N-LrQ 0-30s 110VDC	To be defined
TDB4-U204-QX6 0,6-6s 110 V	330650717	TDB4-U204N-LrQ 0-6s 110VDC	To be defined
TDB4-U204-X6 0-3s 110VDC	330652274	TDB4-U204N- 0-3s 110VDC	To be defined
TDB4-U204-X6 1,5s 110VDC	330650814	TDB4-U204N-Lr 1,5s 110VDC	To be defined
TDB4-U205 0,3-3min 96 V	330650606	TDB4-U205N-Lr 0-3min 96VDC	To be defined
TDB4-U205 0-10min 96 V	330650608	TDB4-U205N-Lr 0-10min 96VDC	To be defined
TDB4-U205 0-10s 96 V	330650603	TDB4-U205N-Lr 0-10s 96VDC	To be defined
TDB4-U205-C 0-10s 96V	330650654	TDB4-U205N-Lr 0-10s 96VDC	To be defined
TDB4-U205 0-60min 96 V	330650610	TDB4-U205N-Lr 0-60min 96VDC	To be defined
TDB4-U205 5s 96V	330650655	TDB4-U205N-Lr 5s 96VDC	To be defined
TDB4-U205-E 0-10s 96 V	330650656	TDB4-U205N-ELr 0-10s 96VDC	To be defined
TDB4-U207 0,1-1s 36 V	330650200	TDB4-U207N-Lr 0-1s 36VDC	To be defined
TDB4-U207 0,25s 36V	330650252	TDB4-U207N-Lr 0,25s 36VDC	To be defined
TDB4-U207 0,3-3min 36 V	330650206	TDB4-U207N-Lr 0-3min 36VDC	To be defined
TDB4-U207 0-30min 36V code Hs	330650253	TDB4-U207N-Lr 0-30min 36VDC code HS	To be defined
TDB4-U207 0-60min 36 V	330650210	TDB4-U207N-Lr 0-60min 36VDC	To be defined
TDB4-U207-C 0,5s 36V	330650260	TDB4-U207N-Lr 0,5s 36VDC	To be defined
TDB4-U207-C 0,5s 36V code Bs	330650261	TDB4-U207N-Lr 0,5s 36VDC code BS	To be defined
TDB4-U207-C 0-10s (5s) 36V	330650266	TDB4-U207N-Lr 0-10s (5s) 36VDC	To be defined
TDB4-U207-C 15s 36V code BT	330650262	TDB4-U207N-Lr 15s 36VDC code BT	To be defined
TDB4-U207-C 0-30s (15s) 36V	330650256	TDB4-U207N-Lr 0-30s (15s) 36VDC	To be defined
TDB4-U207-C 2min 36V	330650255	TDB4-U207N-Lr 2min 36VDC	To be defined
TDB4-U207-C 30min 36V code BV	330650264	TDB4-U207N-Lr 30min 36VDC code BV	To be defined
TDB4-U207-C 30min 36V	330650257	TDB4-U207N-Lr 30min 36VDC	To be defined
TDB4-U207-C 3min 36V	330650254	TDB4-U207N-Lr 3min 36VDC	To be defined
TDB4-U207-C 5min 36V	330650258	TDB4-U207N-Lr 5min 36VDC	To be defined
TDB4-U207-C 5min 36V code BU	330650263	TDB4-U207N-Lr 5min 36VDC code BU	To be defined
TDB4-U210-E 0,6-6s 120 V	330651152	TDB4-U210N-ELr 0-6s 120VDC	To be defined
TDB4-U210-E 0-30min 120 V	330651159	TDB4-U210N-ELr 0-30min 120VDC	To be defined
TDB4-U210-E 0-60s 120V	330651155	TDB4-U210N-ELr 0-60s 120VDC	To be defined
TDB4-U215 0,6-6s 220 V	330650902	TDB4-U215N-Lr 0-6s 220VDC	To be defined

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รายการที่ 8

Mors Smitt
A Wabtec Company

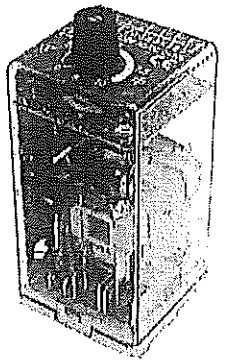
/// Plug-in timer relay, delay-off with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

TDE4N-U

Timer relay, delay-off

Part of D-platform



Description

Plug-in electronic railway timer relay with four change-over contacts. When the relay is de-energized there is a delay on drop-out without any auxillary power supply. The delay time is adjustable with a lockable knob. The relay can also be supplied with a fixed time delay (no knob).

The relay is equipped with a LED which indicates the presence of energizing voltage. Standard equipped with back EMF suppression and magnetic arc blow-out for high breaking capacity and long contact life.

The construction of the relay and choice of materials makes the TDE4N-U relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments.

No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions. Compact design, choice of many options and a wide range of sockets makes the TDE4N-U relay an easy and flexible solution to use.

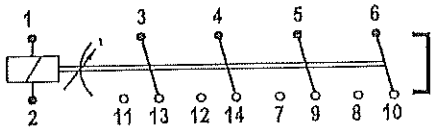
Application

These relay series are designed for demanding rolling stock applications. The TDE4N-U is used in applications where a time delay on drop-out is necessary after de-energizing the relay, without using auxiliary supply.

Features

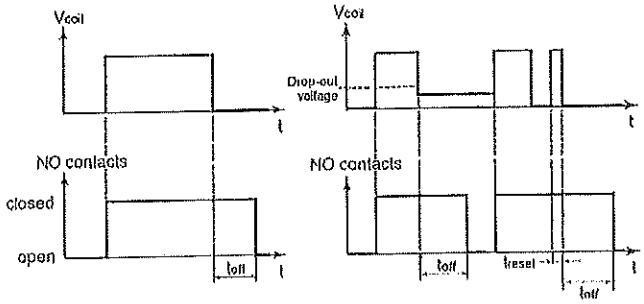
- Time delay relay
- Delay on drop-out (without auxiliary power supply)
- Compact plug-in design
- 4 C/O contacts
- Delay time adjustable by lockable knob
- Also available with fixed time delay
- Total time delay range: 0 s...180 s
- Magnetic arc blow-out
- Back EMF suppression
- One LED for voltage presence
- Suitable for AC and DC voltage
- Flat, square and silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock

Connection diagram



Please note tha relay will leave production in open state (with open armature) with all contacts in the position shown in the connection diagram. Due to severe shocks far exceeding maximum levels mentioned in IEC 61373 (Category I, Class B, Body mounted), it can happen the armature closes and stay closed. Therefore after installation all relays must be checked on correct state of the contacts and apply rated voltage to the coil to check correct operation.

Timing diagrams



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 61373	NF F 62-002
IEC 60947-5-4	

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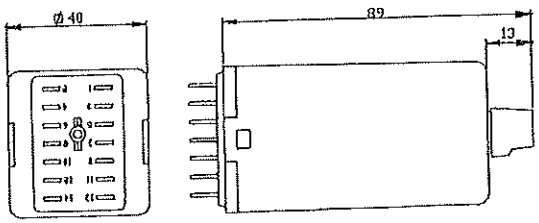
Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Options

- Low temperature (-40 °C)
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double make / double break contacts (-40 °C)

Dimensions (mm)



Sockets

		Mounting			
		Surface/Wall	35mm din rail	Panel/Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Technical specifications

Time delay characteristics

Time delay function		Delay on drop-out (without auxiliary power supply), delay starts when drop-out value is reached.
Available time ranges	Fixed	Any value between 0...180 s with resolution of 0.1 s
	Adjustable*	0...1 s 0...3 s 0...6 s 0...10 s 0...30 s 0...60 s 0...100 s 0...180 s Other time ranges on request
Accuracy	Adjustment	< 10 % of full scale After adjusting / fixed time setting: no variation in setpoint
	Repeatability	Fixed: 1 % of fixed value Adjustable: 1 % of full scale value
Time variation	vs. voltage variations	± 0.1 % / % U_{nom} of set value ± 50 ms
	vs. temperature variation	± 0.02 % / K of set value
Recovery time		0 s
Pull-in time		< 100 ms
Release time		Depending on drop-out time setting

Example time delay : Time range 0 - 3 s. Time delay manually set on 2 s : delay will be between 1.7 s - 2.3 s.
For example: 2.0 s, accuracy due to repeatability, voltage and temperature variation:
The ambient temperature is 30 °C which is 10 degrees different compared to the standard 20 °C. This results in 0.2 % extra time variation. The applied voltage is 15 % lower than the nominal voltage. This results in 1.5 % extra time variation. The total maximum time variation is:
1.0 % (repeatability) x 3 = 0.03 s
+ 0.2 % (temperature variation) x 2 = 0.04 s
+ 1.5 % (voltage variation) x 2 = 0.03 s
= 0.10 s
In this case every new delay time will be between 1.90 s and 2.10 s.

Remarks:
- Inside the TDE4N is a bistable relay controlled by electronics; the relay can stay in energized mode after removing the control voltage in case the electronics are damaged (e.g. due to a power surge)
- For safety-critical applications we recommend the TDBE4 relay, which doesn't use a bistable relay inside

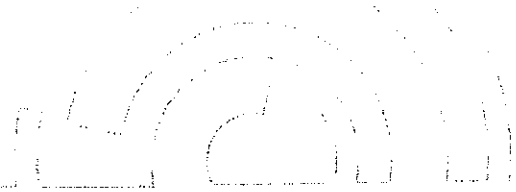
Coil characteristics

Minimum operate pulse time	100 ms
Operating voltage range	DC: 0.7-1.25 U_{nom}, AC: 0.8-1.20 U_{nom} (50 Hz and 60 Hz)
Guaranteed drop-out voltage	6 V (24-60 V version), 23 V (72-230 version)
Nominal current	< 3 mA (24-60 V version), < 2 mA (72-230 V version)
Inrush current (< 100 ms)	< 750 mA (24-60 V version), < 350 mA (72-230 V version)
Reset internal timer when delay-off is activated - Minimum reset pulse, t_{reset}, adjustable - Minimum reset pulse, t_{reset}, fixed	 0.1 % of time range + 20 ms 0.2 % of time range + 20 ms

Type	U_{nom} (VAC)	U_{min} (VAC)	U_{min} (VDC)	U_{max} (VAC)	U_{max} (VDC)
TDE4N-U	24-60	19.2	16.8	72	75
	72-230	57.6	50.4	276	287.5

Remarks:
- U_{min} is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage

Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.



Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Contact characteristics

Amount and type of contacts		4 C/O
Maximum make current		16 A
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	Pole-pole, IEC 60255-5	4 kV, 50 Hz, 1 min
	Cont-coil, IEC 60077	2.5 kV, 50 Hz, 1 min
	Open contacts	2.5 kV; 50 Hz; 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)
EMC	EN 60121-3-2 compliant	

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Torque value screw to lock knob	0.2-0.4 Nm
Weight	190 g (without options)

Environmental characteristics

Environmental	EN 50125-1 and IEC 6007-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (with option C: -40 °C)
Humidity	93%
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

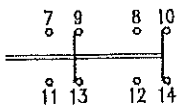
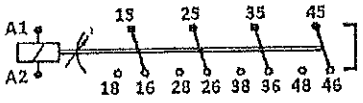
Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947-5-4	Railway applications - Electromechanical components for control applications. This standard examines both coil and contact specifications in depth.
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

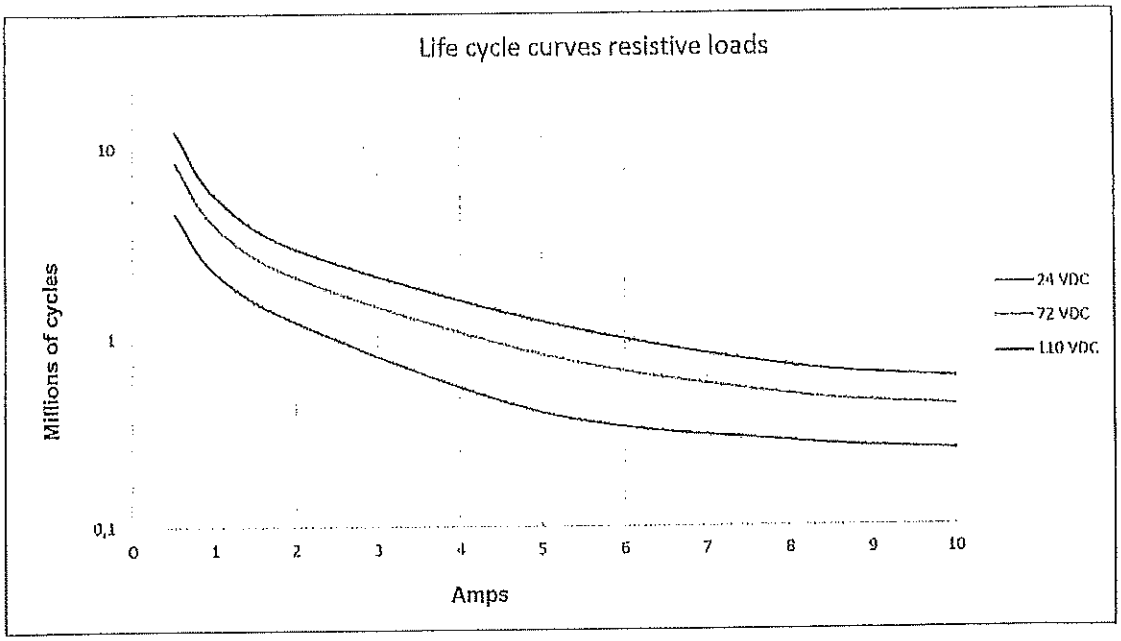
Options

Order	Description	Remark	Can not be combined with
Standard options:			
C	Low temperature (-40 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PD1/PD2 and contact load > 0.5 A.	
N	No magnetic arc blow-out		
Y	Double make/double break contacts	2 C/O DM/DB, -40 °C 	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E
X8	DIN marking	 Numbering relay bottom side standard (no DIN) marking	

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

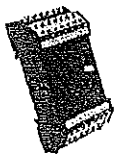
Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

Mounting possibilities/sockets

 V3	 V22BR	 V23	 V23BR	 V26
 V29	 V31	 V32	 V33	

Surface/wall mounting

338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting

338100100	V3	Solder tag socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000670	V33	Push-in terminal socket, panel mount, rear dual connection (3.3 mm²)

PCB mounting

338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

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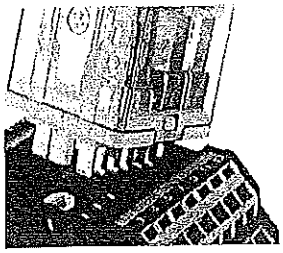
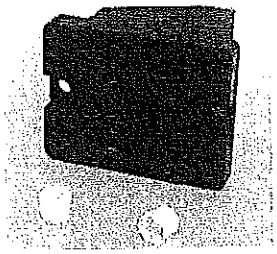
Mechanical keying relay and socket (optional)



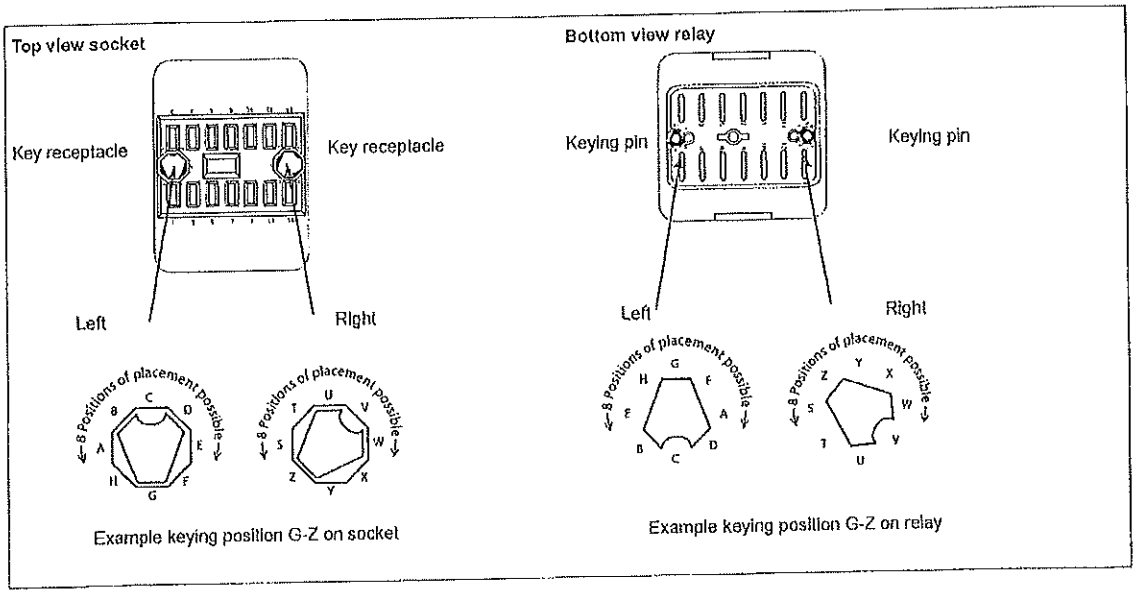


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



Keying codes

	Coil voltage code	
	24 VDC	125 VDC
Silver contacts (standard)	AS	AU
Gold contacts (option E)	DT	AZ
Silver tin oxide (option M)	GT	GV

Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

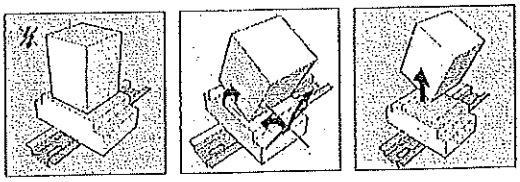
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail. Torque value screw to lock knob: 0.2-0.4 Nm.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

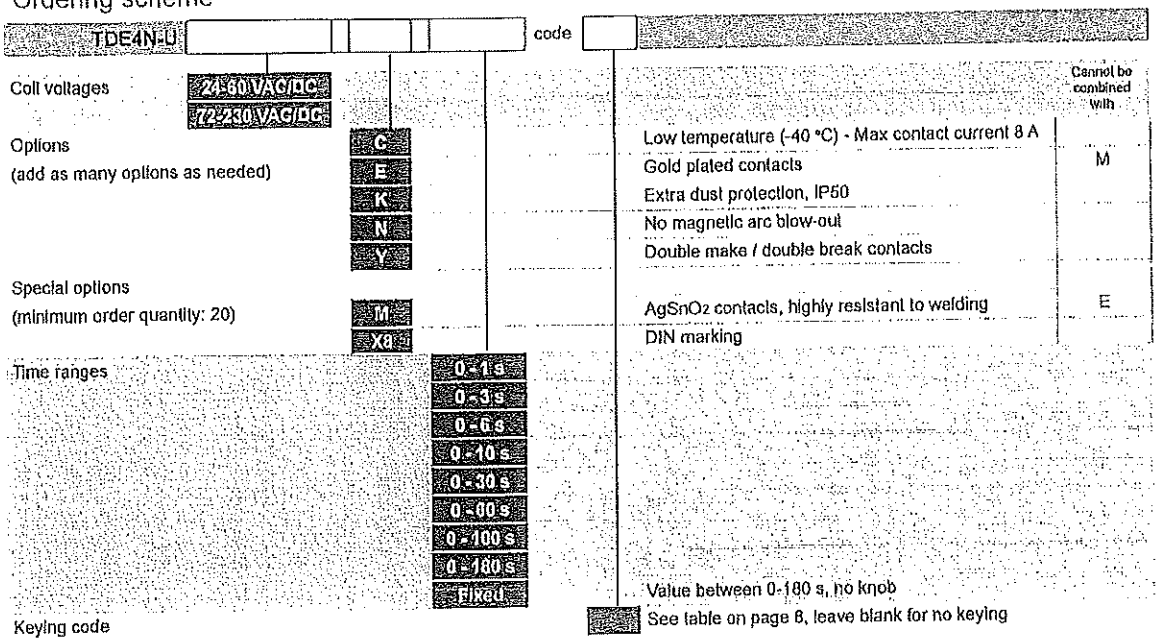
Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Ordering scheme



Example: TDE4N-U 72-230 VAC/DC CE 0-10 s
Description: TDE4N-U relay, Unom: 72-20 VAC/DC, gold plated contacts, low temperature (-40 °C), adjustable delay time 0-10 s, no keying code

Example: TDE4N-U 24-60 VAC/DC Y 120 s AS
Description: TDE4N-U relay, Unom: 24-60 VAC/DC, double make / double break contacts, fixed time delay time 120 s, keying code AS

Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Classic product		New product	
Description TDE4N-U series	Part number U series	Description TDE4N-UN series	Part number UN series
TDE4N-U 72-230VAC/DC 0-100s (30s)	330690089	TDE4N-UN 72-230VAC/DC LrX2 0-100s (30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s (45s)	330690062	TDE4N-UN 72-230VAC/DC LrX2 0-100s (45s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s code EX	330690090	TDE4N-UN 72-230VAC/DC LrX2 0-100s code EX	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(100s)	330690178	TDE4N-UN 72-230VAC/DC LrX2 0-100s(100s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(10s)	330690029	TDE4N-UN 72-230VAC/DC LrX2 0-100s(10s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(15s)	330690002	TDE4N-UN 72-230VAC/DC LrX2 0-100s(15s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(30s)	330690001	TDE4N-UN 72-230VAC/DC LrX2 0-100s(30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(35s)	330690179	TDE4N-UN 72-230VAC/DC LrX2 0-100s(35s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(40s)	330690082	TDE4N-UN 72-230VAC/DC LrX2 0-100s(40s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(60s)	330690000	TDE4N-UN 72-230VAC/DC LrX2 0-100s(60s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(90s)	330690014	TDE4N-UN 72-230VAC/DC LrX2 0-100s(90s)	To be defined
TDE4N-U 72-230VAC/DC 0-10s	330690007	TDE4N-UN 72-230VAC/DC LrX2 0-10s	To be defined
TDE4N-U 72-230VAC/DC C 0-10s	330690028	TDE4N-UN 72-230VAC/DC LrX2 0-10s	To be defined
TDE4N-U 72-230VAC/DC C 0-10s (10s)	330690041	TDE4N-UN 72-230VAC/DC LrX2 0-10s (10s)	To be defined
TDE4N-U 72-230VAC/DC 0-10s (6s)	330690058	TDE4N-UN 72-230VAC/DC LrX2 0-10s (6s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s (6s)	330690026	TDE4N-UN 72-230VAC/DC LrX2 0-10s (6s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(1,5s)	330690098	TDE4N-UN 72-230VAC/DC LrX2 0-10s(1,5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(1s)	330690010	TDE4N-UN 72-230VAC/DC LrX2 0-10s(1s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(2.5s)	330690030	TDE4N-UN 72-230VAC/DC LrX2 0-10s(2,5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(2s)	330690017	TDE4N-UN 72-230VAC/DC LrX2 0-10s(2s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(3s)	330690018	TDE4N-UN 72-230VAC/DC LrX2 0-10s(3s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(4s)	330690023	TDE4N-UN 72-230VAC/DC LrX2 0-10s(4s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(5s)	330690019	TDE4N-UN 72-230VAC/DC LrX2 0-10s(5s)	To be defined
TDE4N-U 72-230VAC/DC 0-180s	330690035	TDE4N-UN 72-230VAC/DC LrX2 0-180s	To be defined
TDE4N-U 72-230VAC/DC C 0-180s (180s)	330690193	TDE4N-UN 72-230VAC/DC LrX2 0-180s (180s)	To be defined
TDE4N-U 72-230VAC/DC 0-1s	330690037	TDE4N-UN 72-230VAC/DC LrX2 0-1s	To be defined
TDE4N-U 72-230VAC/DC C 0-1s(0.3s)	330690033	TDE4N-UN 72-230VAC/DC LrX2 0-1s(0,3s)	To be defined
TDE4N-U 72-230VAC/DC 0-30s	330690004	TDE4N-UN 72-230VAC/DC LrX2 0-30s	To be defined
TDE4N-U 72-230VAC/DC C 0-30s	330690008	TDE4N-UN 72-230VAC/DC LrX2 0-30s	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (15s)	330690011	TDE4N-UN 72-230VAC/DC LrX2 0-30s (15s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (30s)	330690032	TDE4N-UN 72-230VAC/DC LrX2 0-30s (30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (4s)	330690186	TDE4N-UN 72-230VAC/DC LrX2 0-30s (4s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (5s)	330690048	TDE4N-UN 72-230VAC/DC LrX2 0-30s (5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s(10s)	330690024	TDE4N-UN 72-230VAC/DC LrX2 0-30s(10s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s(3s)	330690020	TDE4N-UN 72-230VAC/DC LrX2 0-30s(3s)	To be defined
TDE4N-U 72-230VAC/DC 0-3s	330690049	TDE4N-UN 72-230VAC/DC LrX2 0-3s	To be defined

Mors Smitt
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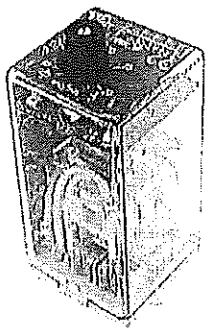
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

FDA4-U200

Flashing relay

Part of D-platform



Features

- Flashing relay (symmetrical)
- Duty cycle: 50 %
- Compact plug-in design
- 4 C/O contacts
- Fixed pulse rate
- Pulse times between 0.2 s...60 min
- Also available with adjustable pulse rate (with knob)
- Magnetic arc blow-out
- Two LEDs for status indication
- Flat, square and silver plated relay pins for excellent socket connection
- Integrated snap lock
- Optional positive mechanical keying relay to socket

Description

Plug-in electronic railway pulsing relay with four change-over contacts. When the relay is activated the coil starts with an interval. The pulse time and interval time are equal. The relay is supplied with a fixed pulsing frequency. The relay can also be supplied with an adjustable pulsing frequency (relay with knob).

The relay is equipped with two LEDs which indicate the presence of power supply and the energizing of the coil. Also standard equipped with magnetic arc blow-out for high breaking capacity and long contact life.

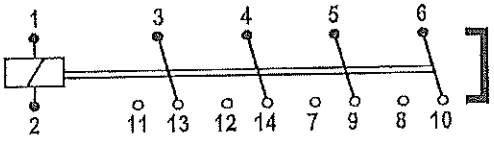
The construction of the relay and choice of materials makes the FDA4-U200 relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments. No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

Compact design, choice of many options and a wide range of sockets makes the FDA4-U200 relay an easy and flexible solution to use.

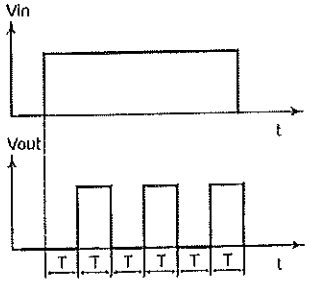
Application

These relay series are designed for demanding train borne applications. The FDA4-U200 is used in applications where a pulse frequency in output is necessary after activating the relay.

Connection diagram



Timing diagram



Example:
Pulse frequency: 60 imp/min
T = 0.5 s

Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	

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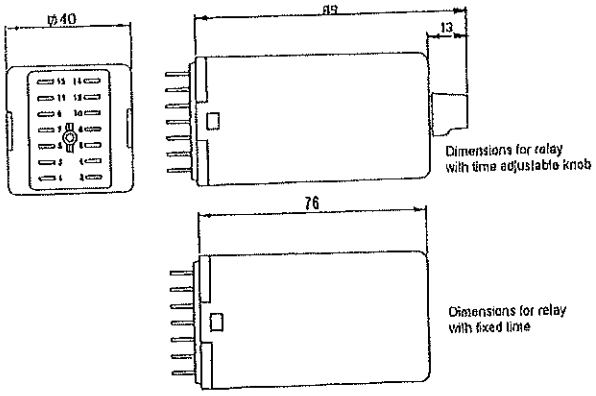
Flashing relay
FDA4-U200

Options

- Low temperature (-40 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode over coil
- Keying

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface/Wall	35mm rail	Panel/Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Mors Smitt
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Flashing relay
FDA4-U200

Technical specifications

Pulse characteristics

Pulse function		Flashing (symmetrical); duty cycle 50 %
Frequency	Fixed pulse (set value in factory)(xx)	Selectable between 300 imp/min and 1/60 imp/min
	Adustable pulse	On request, ratio min:max = 1:3
Accuracy	Set value in factory	< 5 %
	Voltage variation	± 0.06 % / % Unom
	Repeatability	± 0.5 %
	Temperature variation	± 0.02 % / K
Recovery time		± 0.1 s
Release time		< 30 ms
Maximum permissable ripple		50 %

Example
Pulse frequency: 20 - 60 imp/min
Pulse frequency set on 30 imp/min: pulse cycle time is 2.0 s.
The ambient temperature is 40 degrees Celsius which is 20 degrees different compared to the standard 20 degrees Celsius. This results in 0.4 % pulse cycle time variation. The applied voltage is 30 % lower than the nominal voltage. This results in 1.5 % extra time variation. The total time variation is then 0.5 % (repeatability) + 0.4 % (time variation) + 1.5 % (voltage variation) = 2.4 %. In this case the pulse cycle time will be between 1.95 s and 2.05 s.

Coil characteristics

Operating voltage range		0.7...1.25 U_{nom}
Nominal power consumption	During time delay	< 0.875 W (220 V) < 0.375 W (110 V) Lower voltage = lower power
	After time delay	< 3.6 W (220 V) < 3 W (110 V) Lower voltage = lower power

Type	U_{nom} (VDC)	U_{min} (VDC)	U_{max} (VDC)
FDA4-U201-xx	24	16.8	30
FDA4-U202-xx	48	33.6	60
FDA4-U203-xx	72	50.4	90
FDA4-U204-xx	110	77.0	138
FDA4-U205-xx	96	67.2	120
FDA4-U207-xx	36	25.2	45

Other types on request

Remarks:
- Umin is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation). In practice the relay picks up at a lower voltage
- Udrop-out is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation). In practice the relay drops out at a higher voltage (Urelease)
- To reset the time function, the voltage must drop below Udrop-out
- Always select the nominal voltage as close as possible to the actual voltage in the application

Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.

Contact characteristics

Amount and type of contacts		4 C/O
Maximum make current		16 A
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	Pole-pole	4 kV, 50 Hz, 1 min
	Cont-coil	2.kV, 50 Hz, 1 min
	Open contacts	2.5 kV; 50 Hz; 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	100 g (without options)

Environmental characteristics

Environmental	EN 50125-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (optional: -40 °C)
Humidity	95% (condensation is permitted temporarily)
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

Mors Smitt
A Wabtec Company

Flashing relay
FDA4-U200

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

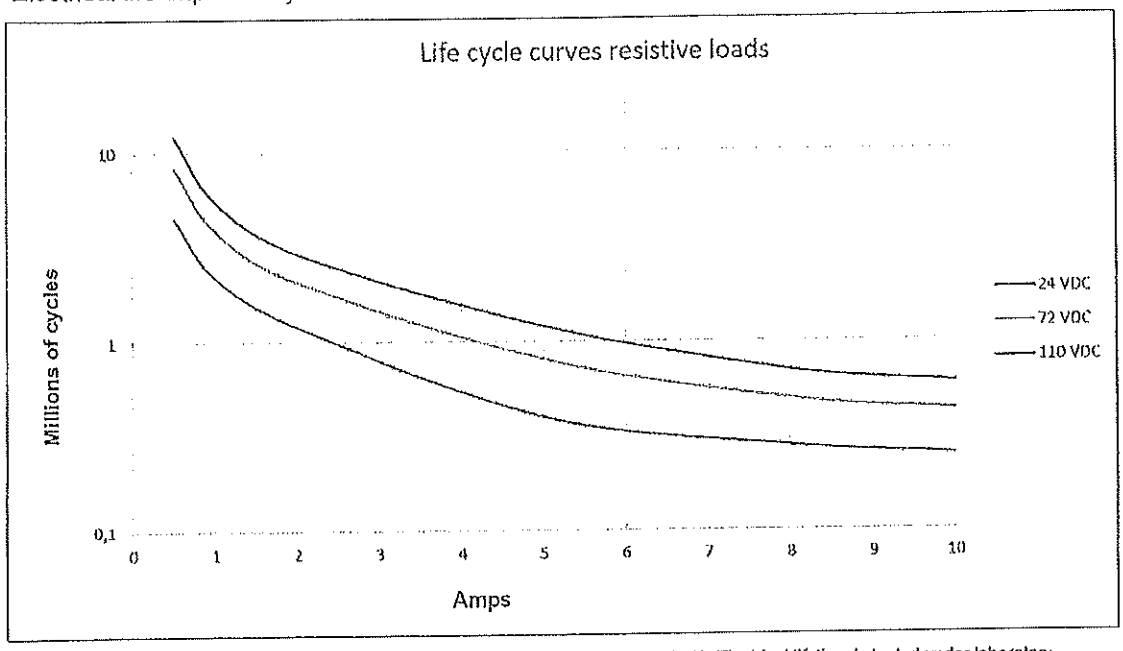
Options

Code	Description	Remark	Cannot be combined with
Standard options:			
C	Low temperature (-40 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PD1/PD2 and contact load > 0.5 A.	
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Max. allowed peak voltage180 V, higer voltage will damage the diode	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads; contact Mors Smitt.

Mors Smitt
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Flashing relay
FDA4-U200

Mounting possibilities/sockets

 V3	 V22BR	 V23	 V23BR	 V26
 V29	 V31	 V32	 V33	

Surface/wall mounting

338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting

338100100	V3	Solder lag socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A250 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm²)

PCB mounting

338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

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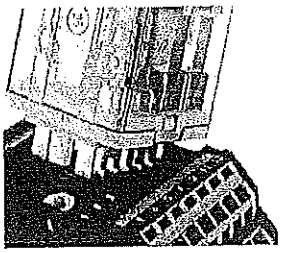
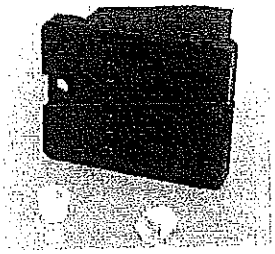
Flashing relay
FDA4-U200

Mechanical keying relay and socket (optional)



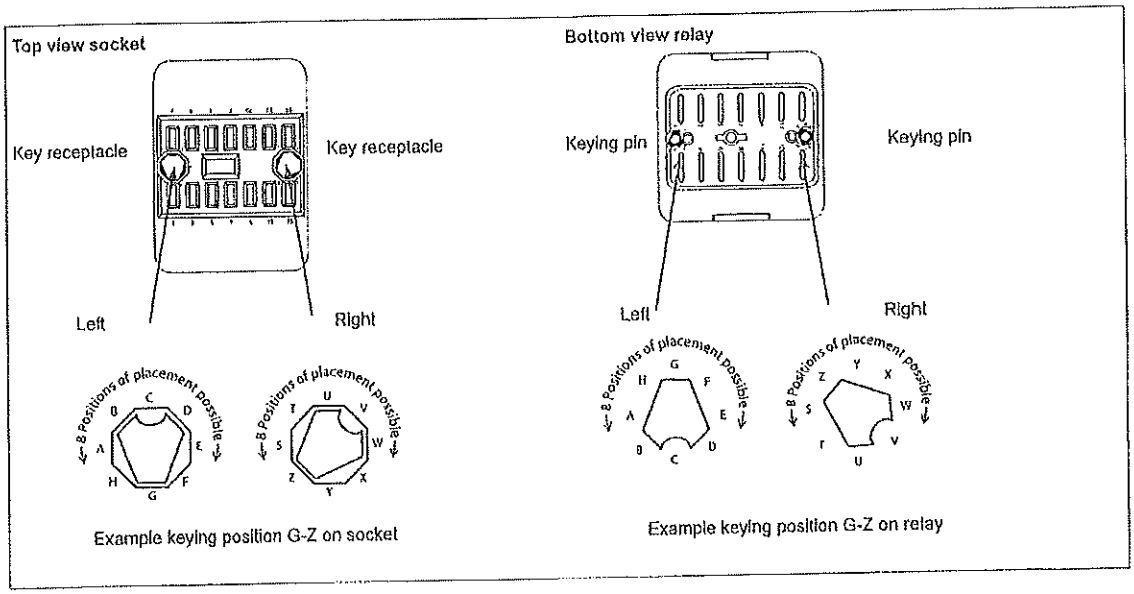


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



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Flashing relay
FDA4-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

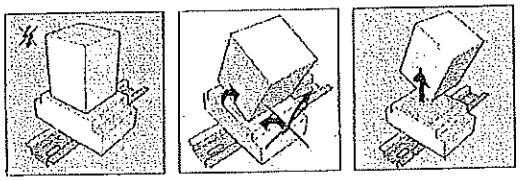
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

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Mors Smitt
A Wabtec Company

Flashing relay
FDA4-U200

Ordering scheme

FDA4-U					
Coil voltages	201			24 VDC	
	207			36 VDC	
	202			48 VDC	
	203			72 VDC	
	205			96 VDC	Cannot be combined with
	204			110 VDC	
Options		C		Low temperature (-40 °C) - Max contact current 8 A	
(add as many options as needed)		E		Gold plated contacts	M
		K		Extra dust protection, IP50	
		N		No magnetic arc blow-out	
		Q		Double zener diode	
Special options					
(minimum order quantity: 20)		M		AgSnO2 contacts, highly resistant to welding	E
Pulse frequency			Fixed	Selectable between 300 imp/min and 1/60 imp/min	
			Adjustable	On request	

Examples:

FDA4-U204-CE 100 imp/min
Description: FDA4-U204 relay, Unom 110 VDC, low temperature (-40 °C), gold plated contacts, pulse frequency: 100 imp/min

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Mors Smitt
A Wabtec Company

Flashing relay
FDA4-U200

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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ต้นฉบับ

ใบเสนอราคาซื้อโดยวิธีเฉพาะเจาะจง

ใบเสนอราคา

เรียน ประธานคณะกรรมการซื้อโดยวิธีเฉพาะเจาะจง

๑) ข้าพเจ้า (ระบุชื่อ (บริษัท)/ห้าง/ร้าน) ที่เอ็มที มาร์ทแอนด์เซอร์วิส จำกัด
สำนักงานใหญ่ตั้งอยู่เลขที่ 175-177 ชั้น G ถนน สรรพาวุธ ตำบล/แขวง สรรพาวุธ
(อาคารบางกอกสหมิตรทาวเวอร์)
อำเภอ/เขต บางรัก จังหวัด ก.ท.ม.
โทรศัพท์หมายเลข 02 237 0889 โทรสารหมายเลข 02 237 0889
เลขประจำตัวผู้เสียภาษีอากร โดย
ผู้ลงนามข้างท้ายนี้ ได้พิจารณาเงื่อนไขต่าง ๆ ในเอกสารการซื้อโดยวิธีเฉพาะเจาะจง เลขที่
โดยตลอด และยอมรับข้อกำหนดและเงื่อนไขนั้นแล้ว รวมทั้งรับรองว่าข้าพเจ้าเป็นผู้มีคุณสมบัติครบถ้วนตามที่กำหนดและไม่เป็นผู้ทิ้งงานของหน่วยงานของรัฐ

๒) ข้าพเจ้าขอเสนอรายการพัสดุ รวมทั้งบริการ ซึ่งกำหนดไว้ในเอกสารการซื้อโดยวิธีเฉพาะเจาะจง ดังต่อไปนี้

ข้อที่	จำนวน	รายการสิ่งของ	ราคาต่อหน่วย [ไม่รวม VAT]			ราคารวม [ไม่รวม VAT]	
			ต่อ	บาท	สต.	บาท	สต.
1	10 ชิ้น	#330213814 Plug in Instantaneous Relay Type: D-U204 110 VDC with gold plated contact		26,000.	—	260,000.	—
2	10 ชิ้น	Plug in Instantaneous Relay Type: D-U204 110 VDC #330213803		18,700.	—	187,000.	—
3	10 ชิ้น	Plug in Instantaneous Relay Type: D-U201 24 VDC #330213800		18,700.	—	187,000.	—
4	10 ชิ้น	Plug in Time Delay Relay Type: TDB4-U204-Q 3-3mln #330650775		38,000.	—	380,000.	—
5	10 ชิ้น	Plug in Time Delay Relay Type: TDB4-U204-Q 0-30 min #330652271		38,000.	—	380,000.	—
6	10 ชิ้น	Plug in Time Delay Relay Type: TDB4-U204-Q 0-30 s #330230752		38,000.	—	380,000.	—
7	10 ชิ้น	Plug in Time Delay Relay Type: TDB4-U204-Q 0-10 s #330652272		38,000.	—	380,000.	—
8	10 ชิ้น	Plug in Time Delay Off Relay Type: TDE4N-U 12-230 VAC/DC #330690049		58,000.	—	580,000.	—
9	10 ชิ้น	Plug in Flashing Relay Type: FDA4-U204-C #331342074		27,500.	—	275,000.	—
		(ที่ไม่พอกรอกให้ใช้ใบต่อ)					

- กำหนดส่งของภายใน 180 (วัน)/เดือน/ปี นับถัดจากวันที่ลงนามในสัญญา
- รับประกันความชำรุดบกพร่อง ภายใน 1 วัน/เดือน/(ปี)
- ผลิตภัณฑ์ยี่ห้อ Mors Smitt
- ผลิตโดย Mors Smitt ประเทศ โนแลนทีปปูโรป
- จำหน่ายโดย บริษัท มาร์โคล-แอร์ (ประเทศไทย) จำกัด ประเทศ ไทย

หมายเหตุ ผู้เสนอราคาต้องเสนอราคาแต่ละรายการเพียงราคาเดียวเท่านั้น มิฉะนั้น จะไม่พิจารณาราคาที่เสนอ

รวมเงินค่าของ	3,009,000. —
ภาษีมูลค่าเพิ่มร้อยละ ๗	210,630. —
รวมเป็นเงินทั้งสิ้น	3,219,630. —

(เงิน สามล้านสองแสนหนึ่งหมื่นเก้าพันหกร้อยสามสิบบาทถ้วน)
(จำนวนเงินเป็นตัวอักษร)

๓) ข้าพเจ้าจะยืนคำเสนอนี้เป็นระยะเวลา ..... วัน นับแต่วันยื่นข้ออราคา และ รฟฟท. อาจรับคำเสนอนี้ ณ เวลาใดก็ได้ก่อนที่จะครบกำหนดระยะเวลาดังกล่าว หรือระยะเวลาที่ได้ยืดออกไปตามเหตุผลอันสมควรที่ รฟฟท. ร้องขอ

๔) ข้าพเจ้ารับรองว่าจะส่งมอบงานซื้อตามเงื่อนไขที่เอกสารซื้อโดยวิธีเฉพาะเจาะจงกำหนดไว้

๕) ในกรณีที่ข้าพเจ้าได้รับการพิจารณาให้เป็นผู้ขนะการเสนอราคา ข้าพเจ้ารับรองที่จะ

๕.๑) ทำสัญญาตามแบบสัญญาซื้อขายแนบท้าย กับ รฟฟท. ภายใน ..... วัน นับแต่วันที่ได้รับหนังสือแจ้งให้ไปทำสัญญา

๕.๒) มอบหลักประกันการปฏิบัติตามสัญญาตามที่ระบุไว้ในเอกสารการซื้อโดยวิธีเฉพาะเจาะจง ให้แก่ รฟฟท. ขณะที่ได้ลงนามในสัญญา เป็นจำนวนร้อยละ ๕ ของราคาตามสัญญาที่ได้ระบุไว้ในใบเสนอราคานี้ เพื่อเป็นหลักประกันการปฏิบัติตามสัญญาโดยถูกต้องและครบถ้วน

หากข้าพเจ้าไม่ปฏิบัติให้ครบถ้วนตามที่ระบุในข้อ ๕.๑ และ/หรือ ๕.๒ ดังกล่าวข้างต้น ข้าพเจ้ายอมชดใช้ค่าเสียหายใด ๆ ที่อาจมีแก่ รฟฟท. และ รฟฟท. มีสิทธิจะให้ผู้ยื่นเสนอราคารายอื่นเป็นผู้ขนะการเสนอราคาได้ หรือ รฟฟท. อาจดำเนินการจัดซื้อใหม่ก็ได้

๖) ข้าพเจ้ายอมรับว่า รฟฟท. ไม่มีความผูกพันที่จะรับคำเสนอนี้ หรือใบเสนอราคาใดๆ รวมทั้งไม่ต้องรับผิดชอบค่าใช้จ่ายใดๆ อันอาจเกิดขึ้นในการที่ข้าพเจ้าได้เข้าเสนอราคาครั้งนี้

๗) บรรดาหลักฐานประกอบการพิจารณา เช่น ตัวอย่าง [Sample] แค็ตตาล็อก แบบรูปรายการละเอียดคุณลักษณะเฉพาะ [Specification] พร้อมใบเสนอราคา ซึ่งข้าพเจ้าได้ยื่นไว้ต่อ รฟฟท.ไว้เป็นเอกสารและทรัพย์สินของ รฟฟท.

สำหรับตัวอย่างที่เหลือหรือไม่ใช้แล้ว ซึ่ง รฟฟท. ส่งคืนให้ ข้าพเจ้าจะไม่เรียกร้องค่าเสียหายใดๆที่เกิดขึ้นกับตัวอย่างนั้น

๘) ข้าพเจ้าได้ตรวจทานตัวเลขและตรวจสอบเอกสารต่างๆ ที่ได้ยื่นพร้อมใบเสนอราคานี้ โดยละเอียดแล้ว และเข้าใจดีว่า รฟฟท. ไม่ต้องรับผิดชอบใดๆ ในความผิดพลาดหรือตกหล่น

๙) ใบเสนอราคานี้ ได้ยื่นเสนอโดยบริสุทธิ์ยุติธรรมและปราศจากกลฉ้อฉล หรือการสมรู้ร่วมคิดกันโดยมิชอบด้วยกฎหมายกับบุคคลใดบุคคลหนึ่งหรือหลายบุคคล หรือกับห้างหุ้นส่วนบริษัทใด ๆ ที่ได้ยื่นข้อเสนอในคราวเดียวกัน

เสนอมา ณ วันที่ 7 เดือน ธ.ค. พ.ศ. 2566

(ลงชื่อ) .....

TMT PARTS SERVICE CO.,LTD.

(นายมิตรมนต์ ประยูรทอง)

ตำแหน่ง ผู้จัดการ

ประทับตรา (ถ้ามี)

คณะกรรมการฯ ประกอบด้วย

..... ประธานกรรมการ

..... กรรมการผู้พิจารณา

ฝน กรรมการผู้พิจารณา

..... กรรมการผู้พิจารณา

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U204-CL 110VDC	330213725	D-U204N-L 110VDC	to be defined
D-U204-CL 110VDc code AV	330214134	D-U204N-L 110VDC code AV	to be defined
D-U204-CLT 110VDC	330213713	D-U204N-LT 110VDC	to be defined
D-U204-CLT 110VDC code AV	330214427	D-U204N-LT 110VDC code AV	to be defined
D-U204-CLW013 110VDC	330214188	D-U204N-LW013 110VDC	to be defined
D-U204-CPW022 110VDC code AV	330214096	D-U204N-PW022 110VDC code AV	to be defined
D-U204-CQ 110VDC	330213980	D-U204N-Q 110VDC	to be defined
D-U204-CW013 110VDC	330214075	D-U204N-W013 110VDC	to be defined
D-U204-CW013 110VDC code AV	330214386	D-U204N-W013 110VDC code AV	to be defined
D-U204-CW022 110VDC	330214126	D-U204N-W022 110VDC	to be defined
D-U204-CW022 110VDC code AV	330214344	D-U204N-W022 110VDC code AV	to be defined
D-U204-CW031 110VDC code AV	330214387	D-U204N-W031 110VDC code AV	to be defined
D-U204-E 110VDC	330213814	D-U204N-E 110VDC	to be defined
D-U204-E 110VDC code AW	330214051	D-U204N-E 110VDC code AW	to be defined
D-U204-EKLQW022 110VDC code HV	330214350	D-U204N-EKLQW022 110VDC code HV	to be defined
D-U204-EKLW031 110VDC code HV	330214378	D-U204N-EKLW031 110VDC code HV	to be defined
D-U204-EKQ 110VDC	330213884	D-U204N-EKQ 110VDC	to be defined
D-U204-EL 110VDC	330213792	D-U204N-EL 110VDC	to be defined
D-U204-ELK 110VDC	330213979	D-U204N-EKL 110VDC	to be defined
D-U204-ELK 110VDC code HV	330214095	D-U204N-EKL 110VDC code HV	to be defined
D-U204-ELW022 110VDC code HV	330214089	D-U204N-ELW022 110VDC code HV	to be defined
D-U204-ELZ 110VDC	330214265	D-U204N-ELZ 110VDC	to be defined
D-U204-EQ 110VDC	330214015	D-U204N-EQ 110VDC	to be defined
D-U204-EQ 110VDC code HV	330214094	D-U204N-EQ 110VDC code HV	to be defined
D-U204-EQW013 110VDC code HV	330214277	D-U204N-EQW013 110VDC code HV	to be defined
D-U204-EQW022 110VDC code HV	330214279	D-U204N-EQW022 110VDC code HV	to be defined
D-U204-EQW031 110VDC code HV	330214122	D-U204N-EQW031 110VDC code HV	to be defined
D-U204-EW013 110VDC	330214137	D-U204N-EW013 110VDC	to be defined
D-U204-EW022 110VDC	330214371	D-U204N-EW022 110VDC	to be defined
D-U204-EW022 110VDC code HV	330214157	D-U204N-EW022 110VDC code HV	to be defined
D-U204-KC 110VDC	330213897	D-U204N-K 110VDC	to be defined
D-U204-KL 110VDC	330213786	D-U204N-KL 110VDC	to be defined
D-U204-KLC 110VDC	330213602	D-U204N-KL 110VDC	to be defined
D-U204-KLCE 110VDC	330214345	D-U204N-EKL 110VDC	to be defined
D-U204-KLCM 110VDC	330213990	D-U204N-KLM 110VDC	to be defined

ตารางที่ 1

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U203-CLQ 72VDC code AU	330214114	D-U203N-LQ 72VDC code AU	to be defined
D-U203-CM 72VDC code AZ	330214011	D-U203N-M 72VDC code AZ	to be defined
D-U203-CQ 72VDC	330213708	D-U203N-Q 72VDC	to be defined
D-U203-E 72VDC	330213809	D-U203N-E 72VDC	to be defined
D-U203-E 72VDC code AZ	330213895	D-U203N-E 72VDC code AZ	to be defined
D-U203-EK 72VDC	330213873	D-U203N-EK 72VDC	to be defined
D-U203-EKL 72 VDC	330214384	D-U203N-EKL 72 VDC	to be defined
D-U203-EL 72VDC	330213941	D-U203N-EL 72VDC	to be defined
D-U203-EQL 72VDC	330213991	D-U203N-ELQ 72VDC	to be defined
D-U203-KLC 72VDC	330213944	D-U203N-KL 72VDC	to be defined
D-U203-KMPQ 72VDC code GV	330214423	D-U203N-KMPQ 72VDC code GV	to be defined
D-U203-L 72VDC	330213825	D-U203N-L 72VDC	to be defined
D-U203-LQ 72VDC	330214334	D-U203N-LQ 72VDC	to be defined
D-U203-LQ 72VDC code AU	330214260	D-U203N-LQ 72VDC code AU	to be defined
D-U203-LW013 72VDC code AU	330214354	D-U203N-LW013 72VDC code AU	to be defined
D-U203-M 72VDC	330213733	D-U203N-M 72VDC	to be defined
D-U203-Q 72VDC	330213845	D-U203N-Q 72VDC	to be defined
D-U203-Q 72VDC code AU	330213615	D-U203N-Q 72VDC code AU	to be defined
D-U203-QL 72VDC	330213744	D-U203N-LQ 72VDC	to be defined
D-U203-W022 72VDC code AU	330214037	D-U203N-W022 72VDC code AU	to be defined
D-U203-Z 72VDC code AU	330214101	D-U203N-Z 72VDC code AU	to be defined
D-U203-ZW013 72VDC code AU	330214100	D-U203N-W013Z 72VDC code AU	to be defined
D-U203-ZW022 72VDC code AU	330214102	D-U203N-ZW022 72VDC code AU	to be defined
D-U204 110VDC	330213803	D-U204N 110VDC	to be defined
D-U204 110VDC code AV	330213787	D-U204N 110VDC code AV	to be defined
D-U204-C 110VDC	330213830	D-U204N 110VDC	to be defined
D-U204-C 110VDC code AV	330213746	D-U204N 110VDC code AV	to be defined
D-U204-CEKLW022 110VDC	330214424	D-U204N-EKLW022 110VDC	to be defined
D-U204-CEL 110VDC code HV	330214499	D-U204N-EL 110VDC code HV	to be defined
D-U204-CKL 110VDC code AV	330214404	D-U204N-KL 110VDC code AV	to be defined
D-U204-CKLW013 110VDC	330214130	D-U204N-KLW013 110VDC	to be defined
D-U204-CKLW022 110VDC	330214132	D-U204N-KLW022 110VDC	to be defined
D-U204-CKLX6 110VDC	330213584	D-U204N-KL 110VDC	to be defined
D-U204-CKMPW031 110VDC	330214342	D-U204N-KMPW031 110VDC	to be defined
D-U204-CKMPW031 110VDC code GW	330213596	D-U204N-KMPW031 110VDC code GW	to be defined

รายการที่ 2

รายการที่ 3

Classic product		New product	
Description D-U200 relay series	Part number D-U200 relay series	Description D-U200N relay series	Part number D-U200N relay series
D-U201 24VDC	330213800	D-U201N 24VDC	to be defined
D-U201 24VDC code AS	330213788	D-U201N 24VDC code AS	to be defined
D-U201-C 24VDC	330213839	D-U201N 24VDC	to be defined
D-U201-C 24VDC code AS	330213771	D-U201N 24VDC code AS	to be defined
D-U201-CEK 24VDC	330213945	D-U201N-EK 24VDC	to be defined
D-U201-CEKL 24VDC	330214487	D-U201N-EKL 24VDC	to be defined
D-U201-CEKQ 24VDC	330213948	D-U201N-EKQ 24VDC	to be defined
D-U201-CEKQW013 24VDC	330214496	D-U201N-EKQW013 24VDC	to be defined
D-U201-CEKQW013 24VDC code DT	330214490	D-U201N-EKQW013 24VDC code DT	to be defined
D-U201-CEKQW022 24VDC	330214497	D-U201N-EKQW022 24VDC	to be defined
D-U201-CEQ 24VDC	330214349	D-U201N-EQ 24VDC	to be defined
D-U201-CK 24VDC	330214127	D-U201N-K 24VDC	to be defined
D-U201-CKLW013 24VDC	330214131	D-U201N-KLW013 24VDC	to be defined
D-U201-CKLW022 24VDC	330214133	D-U201N-KLW022 24VDC	to be defined
D-U201-CKQ 24VDC code AS	330214489	D-U201N-KQ 24VDC code AS	to be defined
D-U201-CL 24VDC	330213727	D-U201N-L 24VDC	to be defined
D-U201-CL 24VDC code AS	330214281	D-U201N-L 24VDC code AS	to be defined
D-U201-CLPQT 24VDC	330214108	D-U201N-LPQT 24VDC	to be defined
D-U201-CLQT 24VDC	330213992	D-U201N-LQT 24VDC	to be defined
D-U201-CLT 24VDC	330214014	D-U201N-LT 24VDC	to be defined
D-U201-CLW013 24VDC code AS	330214339	D-U201N-LW013 24VDC code AS	to be defined
D-U201-CMW013 24VDC	330214249	D-U201N-MW013 24VDC	to be defined
D-U201-CMW022 24VDC	330214256	D-U201N-MW022 24VDC	to be defined
D-U201-CQ 24VDC	330213958	D-U201N-Q 24VDC	to be defined
D-U201-CW013 24VDC	330214067	D-U201N-W013 24VDC	to be defined
D-U201-CW022 24VDC code AS	330214078	D-U201N-W022 24VDC code AS	to be defined
D-U201-E 24VDC	330213821	D-U201N-E 24VDC	to be defined
D-U201-E 24VDC code DT	330214081	D-U201N-E 24VDC code DT	to be defined
D-U201-EK 24VDC	330213799	D-U201N-EK 24VDC	to be defined
D-U201-EK 24VDC code DT	330213798	D-U201N-EK 24VDC code DT	to be defined
D-U201-EKL 24VDC	330213774	D-U201N-EKL 24VDC	to be defined
D-U201-EKQ 24VDC	330213720	D-U201N-EKQ 24VDC	to be defined
D-U201-EL 24VDC	330213831	D-U201N-EL 24VDC	to be defined
D-U201-EL 24VDC code AS	330213947	D-U201N-EL 24VDC code AS	to be defined
D-U201-EL 24VDC code DT	330214160	D-U201N-EL 24VDC code DT	to be defined

Mors Smitt
A Wabtec Company

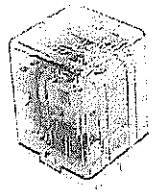
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

D-U200

Instantaneous relay

Part of D-platform



Description

Plug-in railway relay with 4 change-over contacts. Standard equipped with a back EMF suppression diode and magnetic arc blow-out for high breaking capacity and long contact life. Proven reliable operation in switching high DC voltage / inductive loads and low currents. No external retaining clip needed as integrated "snap-lock" will hold relay into socket under all circumstances and mounting directions.

The construction of the relay and choice of materials makes the D-U200 relay suitable to withstand corrosive atmospheres, low and high temperatures, shock & vibrating and dry to very humid environments.

Compact design, choice of many options and a wide range of sockets makes the D-U200 relay an easy and flexible solution to use.

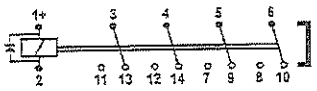
Application

Demanding rolling stock applications such as door control, traction control, braking systems etc. Designed for extreme reliability, within long endurance applications and harsh environments.

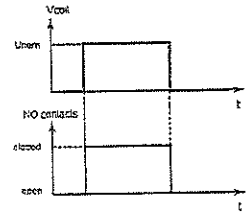
Features

- Instantaneous compact plug-in relay, 4 C/O contacts
- Integrated back EMF suppression diode
- Magnetic arc blow-out for high breaking capacity and long contact life
- Coil voltages 12 to 250 VDC
- Maximum continuous current 10 A
- Maximum switching voltage 250 VDC, 440 VAC
- High breaking capacity
- Minimum switching current 10 mA (optional 1 mA)
- Mechanical life 50 million operations
- Electrical life 10 million operations at 24 VDC, 6.5 A resistive load
- Integrated snaplock, no external retaining clip needed
- Transparent cover for easy visual inspection
- Flexibility with many options and wide range of sockets
- Optional positive mechanical keying relay to socket
- Fully railway compliant

Connection diagram



Timing diagram



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	

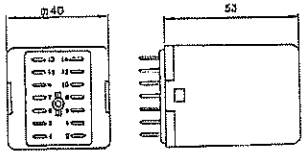
CE EAC

Options

- Weld-no-transfer contacts
- Low temperature (-50 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- LED coil indicator
- Bipolar LED indicator
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Polarisation diode
- Double zener diode
- Push-to-test button
- Coil for both AC and DC
- Double make / double break contacts (-50 °C)
- No diode
- Make before break contact
- Reversed polarity
- Keying

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface / Wall	35 mm rail	Panel / Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder lug	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Mors Smitt
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Technical specifications

Instantaneous relay
D-U200

Coil characteristics

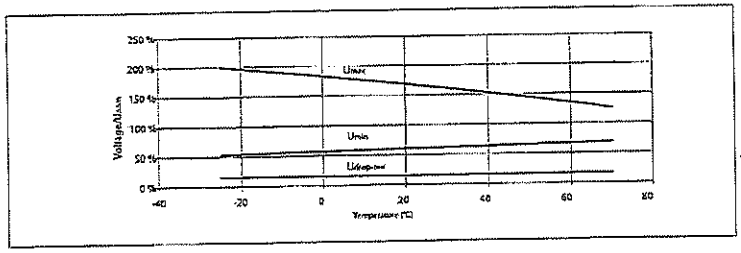
Inductance L/R at Unom (typical value): Energized Released	11 ms 8 ms
Nominal power consumption	2.2 W @ Unom
Operating voltage range	0.7 - 1.25 Unom

Type	Unom (VDC)	Umin (VDC)	Uop (VDC)	Urel (VDC)	Coil (Ω)	Weight (g)
D-U201	24	16.8	30	2.4	270	89
D-U202	48	33.6	60	4.8	1046	46
D-U203	72	50.4	90	7.2	2406	30
D-U204	110	77	137.5	11	5330	21
D-U205	96	67.2	120	9.6	4150	23
D-U206	12	8.4	15	1.2	72	167
D-U207	36	25.2	45	3.6	562	64
D-U208	55	38.5	69	5.5	1300	42
D-U210	120	84	150	12	6160	19
D-U213	125	87.5	156.25	12.5	7534	16
D-U215	220	154	275	22	21776	10
D-U220	250	175	312.5	25	23850	10

Other types on request
* The Rcoil is measured at room temperature and has a tolerance of ± 10%, with option L (LED) the value can differ

Remarks:
- Umin is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situations). In practice the relay picks up at a lower voltage
- Udrop-out is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation). In practice the relay drops out at a higher voltage
- Always select the nominal voltage as close as possible to the actual voltage in the application

Operating range at various temperatures



Remark in June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance

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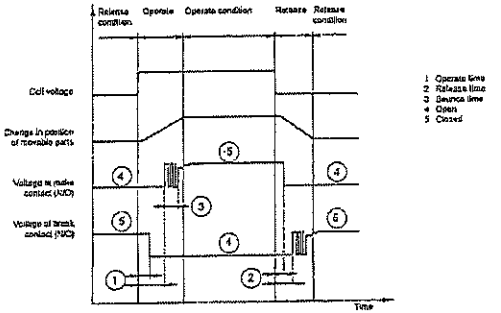
Instantaneous relay
D-U200

Contact characteristics

Amount and type of contacts		4 C/O
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min) 80 A (withstand > 10 x 80 A @ 200 ms, 1 min) 40 A (withstand > 10 x 40 A @ 500 ms, 1 min) 30 A (withstand > 10 x 30 A @ 1000 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Operating times (ms) at nominal voltage (typical value)	Standard relay	With double zener diode (option Q)	With diode (option Z)
Operate time	18	17	19
Release time	21	8	6
Bounce time N/O contacts	7	6	6
Bounce time N/C contacts	6	11	12



Electrical characteristics

Dielectric strength	Pole-pole	4 kV, 50 Hz, 1 min
	Cont-coil	2.5 kV, 50 Hz, 1 min
	Open contacts	2.5 kV; 50 Hz; 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)

Mors Smitt
A Wabtec Company

Instantaneous relay
D-U200

Mechanical characteristics

Mechanical life	50 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	140 g (without options)

Environmental characteristics

Environmental	EN 50125-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+85 °C (optional: -50 °C)
Humidity	95% (condonsation is permitted temporarily)
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2; HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

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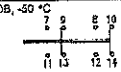
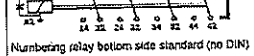
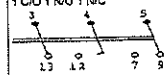
Instantaneous relay
D-U200

Options

Code	Description	Remark	Cannot be combined with:
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au: Gold plated contacts (10 µm)	Yellow tape around relay for identification (option X6)	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PO1/PD2 and contact load > 0.5 A.	T
L	LED integrated in coil		X, X2
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Unorm ≤ 120 V. Maximum allowed peak voltage 180 V, higher voltage will damage the diode. Replaces back EMF diode.	Z
W	Weld no transfer (see datasheet D-U200-W)		T, 11
Y	Double make/double break contacts	2 C/O DM/DB, -50 °C 	11
Z	No diode	Polarity independent	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$ "non-weldable" contacts	Icontact > 100 mA	E
P	Polarisation diode		X, Z
T	Push to test button		K, W
X	Bipolar LED	Only in combination with Q or Z	L, P, X2
X2	AC/DC rectifier bridge	Minimum nominal voltage 24 VDC	L, X
X6	Yellow tape around relay for identification		
X8	DIN marking	 Numbering relay bottom side standard (no DIN marking	
11	Make before break contact	1 C/O 1 N/O 1 N/C  Contact 4-12 will make before contact 3-13 will break during pull-in. No make before break during drop-out.	W, Y

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

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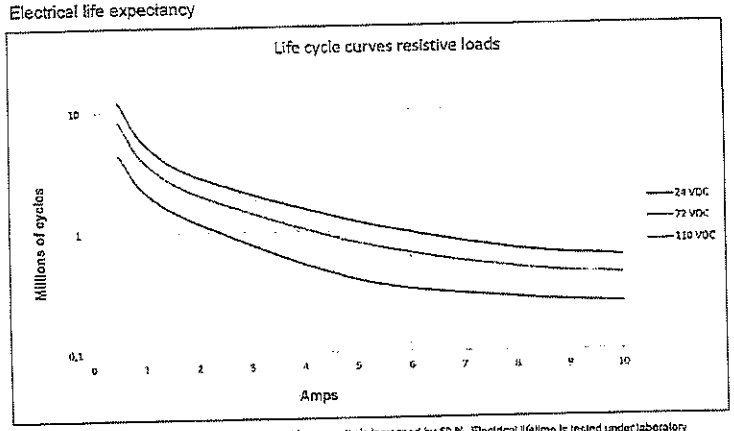
Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0,33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

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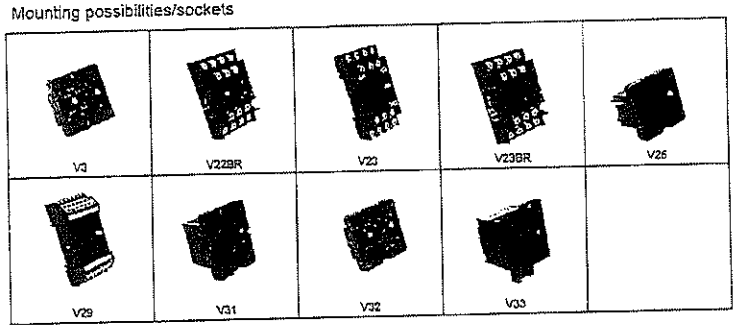
Instantaneous relay
D-U200

Mounting possibilities/sockets



Surface/wall mounting		
338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7,5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2,5 mm²)

Rail mounting		
338000580	V23	Screw socket, rail mount, front connection (7,5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2,5 mm²)

Panel/flush mounting		
338100102	V3	Solder leg socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4,8 x 0,8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2,5 mm²)

PCB mounting		
338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

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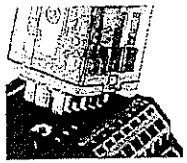
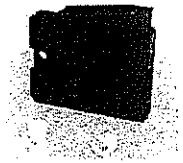
Instantaneous relay
D-U200

Mechanical keying relay and socket (optional)



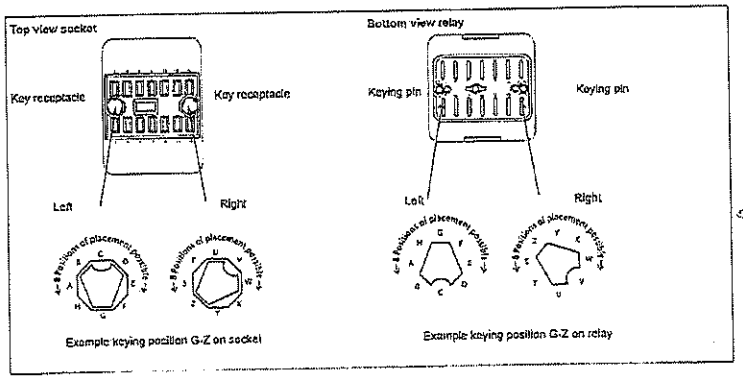


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



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Instantaneous relay
D-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

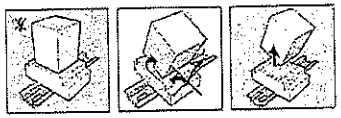
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check contact operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

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Instantaneous relay
D-U200

Ordering scheme

D-U2 - Code

Coil voltages	01		24 VDC
	02		48 VDC
	03		72 VDC
	04		110 VDC
	05		96 VDC
	06		12 VDC
	07		36 VDC
	08		55 VDC
	09		120 VDC
	13		125 VDC
	15		220 VDC
	20		250 VDC
Options (add as many options as needed)		C	Low temperature (-50 °C) - Max contact current 5 A
		E	Gold plated contacts
		K	Extra dust protection, IP50
		L	LED coil indicator
		N	No magnetic arc blow-out
		Q	Double zener diode
		W013	Weld no transfer, 1 NC / 3 NO (see separate datasheet D-U200-W)
		W022	Weld no transfer, 2 NC / 2 NO (see separate datasheet D-U200-W)
		W031	Weld no transfer, 3 NC / 1 NO (see separate datasheet D-U200-W)
		Y	Double make/ double break (-50 °C)
		Z	No diode
Special options (minimum order quantity: 20)		M	AgSnO2 contacts, highly resistant to welding
		P	Polarisation diode
		T	Push-to-test-button
		X	Bipolar LED
		X2	Coil for both DC and AC
		XC	Yellow tape around relay for identification
		XE	DIN marking
		11	Make before break contact
Keying code (optional, leave blank if not required)			Standard, silver contacts
Remark: keying codes are available for all possible coil voltages.		AS	24 VDC D-U201 code AS
		AY	36 VDC D-U207 code AY
		AT	48 VDC D-U202 code AT
		AU	72 VDC D-U203 code AU
		AV	110 VDC D-U204 code AV
			Option E, gold contacts
		DT	24 VDC D-U201-E code DT
		FV	36 VDC D-U207-E code FV
		HU	48 VDC D-U202-E code HU
		AZ	72 VDC D-U203-E code AZ
		HV	110 VDC D-U204-E code HV
			Option M, silver tin oxide contacts
		GT	24 VDC D-U201-M code GT
		HT	36 VDC D-U207-M code HT
		GU	48 VDC D-U202-M code GU
		GV	72 VDC D-U203-M code GV
		GW	110 VDC D-U204-M code GW

Cannot be combined with:	
	M
	T
	X, X2
	Z
	T, 11
	T, 11
	T, 11
	11
	Q, P
	E
	X, Z
	K, W
	L, P, X2
	L, X
	W, Y

Example: D-U204-CL, code AV
Description: D-U200 relay, Unom: 110 VDC, low temperature (-50 °C), LED coil indication, keying code AV

Classic product Description TDB4-U200 series	Part number U200 series	New product Description TDB4-U200N series	Part number U200N series
TDB4-U204-E 0-10s (4s) 110VDC	330652267	TDB4-U204N-ELr 0-10s (4s) 110VDC	To be defined
TDB4-U204-E 0-30s 110 V	330650757	TDB4-U204N-ELr 0-30s 110VDC	To be defined
TDB4-U204-E 0-30s (15s) 110VDC	330652206	TDB4-U204N-ELr 0-30s (15s) 110VDC	To be defined
TDB4-U204-E 0-30s (3s)110 V	330652270	TDB4-U204N-ELr 0-30s (3s) 110VDC	To be defined
TDB4-U204-E 0-60min (45min)110 V	330652287	TDB4-U204N-ELr 0-60min (45min) 110VDC	To be defined
TDB4-U204-E 0-10s (6s) 110VDC	330652259	TDB4-U204N-ELr 0-10s (6s) 110VDC	To be defined
TDB4-U204-N 0-30min (15min)110V	330650784	TDB4-U204N-Lr 0-30min (15min) 110VDC	To be defined
TDB4-U204-EK 0,3-3s (1s) 110VDC	330652278	TDB4-U204N-EKLr 0-3s (1s) 110VDC	To be defined
TDB4-U204-EK 0-60min (45min) 110VDC	330652277	TDB4-U204N-EKLr 0-60min (45min) 110VDC	To be defined
TDB4-U204-EQ 0-10s 110 V	330650765	TDB4-U204N-ELrQ 0-10s 110VDC	To be defined
TDB4-U204-K 10s 110 V	330650785	TDB4-U204N-KLr 10s 110VDC	To be defined
TDB4-U204-K 2,5s 110 V	330650763	TDB4-U204N-KLr 2,5s 110VDC	To be defined
TDB4-U204-C 0,3-3s (1,8s) 110V	330652248	TDB4-U204N-Lr 0-3s (1,8s) 110VDC	To be defined
TDB4-U204-C 0,3-3s (2s) 110V	330652279	TDB4-U204N-Lr 0-3s (2s) 110VDC	To be defined
TDB4-U204-KC 1s 110 V	330650798	TDB4-U204N-KLr 1s 110VDC	To be defined
TDB4-U204-KC 2s 110 V	330650799	TDB4-U204N-KLr 2s 110VDC	To be defined
TDB4-U204-KC 5min 110 V	330652202	TDB4-U204N-KLr 5min 110VDC	To be defined
TDB4-U204-KC 6s 110 V	330652200	TDB4-U204N-KLr 6s 110VDC	To be defined
TDB4-U204-KC 10s 110 V	330652207	TDB4-U204N-KLr 10s 110VDC	To be defined
TDB4-U204-KC 20s 110 V	330652231	TDB4-U204N-KLr 20s 110VDC	To be defined
TDB4-U204-KC 30s 110 V	330652201	TDB4-U204N-KLr 30s 110VDC	To be defined
TDB4-U204-C 0,3-3s 110V	330213657	TDB4-U204N-Lr 0-3s 110VDC	To be defined
TDB4-U204-C 0-60s (10s) 110V	330650815	TDB4-U204N-Lr 0-60s (10s) 110VDC	To be defined
TDB4-U204-KCE 0,6s 110 V	330652223	TDB4-U204N-EKLr 0,6s 110VDC	To be defined
TDB4-U204-KE 10s 110VDC	330652265	TDB4-U204N-EKLr 10s 110VDC	To be defined
TDB4-U204-KE 2s 110VDC	330652276	TDB4-U204N-EKLr 2s 110VDC	To be defined
TDB4-U204-C 0-60s (40s) 110V	330652243	TDB4-U204N-Lr 0-60s (40s) 110VDC	To be defined
TDB4-U204-M 0-10s 110 V	330652225	TDB4-U204N-LrM 0-10s 110VDC	To be defined
TDB4-U204-MY 3s 110VDC code GW	330652245	TDB4-U204N-LrMY 3s 110VDC code GW	To be defined
TDB4-U204-C 0,6-6s (2,5s) 110V	330652253	TDB4-U204N-Lr 0-6s (2,5s) 110VDC	To be defined
TDB4-U204-C 0,6-6s (5s) 110V	330651751	TDB4-U204N-Lr 0-6s (5s) 110VDC	To be defined
TDB4-U204-Q 2s 110 V	330650754	TDB4-U204N-LrQ 2s 110VDC	To be defined
TDB4-U204-Q 3s 110 V	330650773	TDB4-U204N-LrQ 3s 110VDC	To be defined
TDB4-U204-Q 6s 110 V	330650769	TDB4-U204N-LrQ 6s 110VDC	To be defined
TDB4-U204-Q 15s 110 V	330650770	TDB4-U204N-LrQ 15s 110VDC	To be defined
TDB4-U204-Q 0,3-3min 110 V	330650775	TDB4-U204N-LrQ 0-3min 110VDC	To be defined

รายการที่ 4

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Classic product Description TDB4-U200 series	Part number U200 series	New product Description TDB4-U200N series	Part number U200N series
TDB4-U204-Q 0,3-3s 110 V	330650811	TDB4-U204N-LrQ 0-3s 110VDC	To be defined
TDB4-U204-Q 0,6-6s 110 V	330650751	TDB4-U204N-LrQ 0-6s 110VDC	To be defined
TDB4-U204-Q 0-10s 110 V	330652272	TDB4-U204N-LrQ 0-10s 110VDC	To be defined
TDB4-U204-Q 0-10min 110 V	330650812	TDB4-U204N-LrQ 0-10min 110VDC	To be defined
TDB4-U204-Q 0-30min 110 V	330652271	TDB4-U204N-LrQ 0-30min 110VDC	To be defined
TDB4-U204-Q 0-30s 110 V	330650752	TDB4-U204N-LrQ 0-30s 110VDC	To be defined
TDB4-U204-QX6 0,6-6s 110 V	330650717	TDB4-U204N-LrQ 0-6s 110VDC	To be defined
TDB4-U204-X6 0-3s 110VDC	330652274	TDB4-U204N- 0-3s 110VDC	To be defined
TDB4-U204-X6 1,5s 110VDC	330650814	TDB4-U204N-Lr 1,5s 110VDC	To be defined
TDB4-U205 0,3-3min 96 V	330650606	TDB4-U205N-Lr 0-3min 96VDC	To be defined
TDB4-U205 0-10min 96 V	330650608	TDB4-U205N-Lr 0-10min 96VDC	To be defined
TDB4-U205 0-10s 96 V	330650603	TDB4-U205N-Lr 0-10s 96VDC	To be defined
TDB4-U205-C 0-10s 96V	330650654	TDB4-U205N-Lr 0-10s 96VDC	To be defined
TDB4-U205 0-60min 96 V	330650610	TDB4-U205N-Lr 0-60min 96VDC	To be defined
TDB4-U205 5s 96V	330650655	TDB4-U205N-Lr 5s 96VDC	To be defined
TDB4-U205-E 0-10s 96 V	330650656	TDB4-U205N-ELr 0-10s 96VDC	To be defined
TDB4-U207 0,1-1s 36 V	330650200	TDB4-U207N-Lr 0-1s 36VDC	To be defined
TDB4-U207 0,25s 36V	330650252	TDB4-U207N-Lr 0,25s 36VDC	To be defined
TDB4-U207 0,3-3min 36 V	330650206	TDB4-U207N-Lr 0-3min 36VDC	To be defined
TDB4-U207 0-30min 36V code Hs	330650253	TDB4-U207N-Lr 0-30min 36VDC code HS	To be defined
TDB4-U207 0-60min 36 V	330650210	TDB4-U207N-Lr 0-60min 36VDC	To be defined
TDB4-U207-C 0,5s 36V	330650260	TDB4-U207N-Lr 0,5s 36VDC	To be defined
TDB4-U207-C 0,5s 36V code Bs	330650261	TDB4-U207N-Lr 0,5s 36VDC code BS	To be defined
TDB4-U207-C 0-10s (5s) 36V	330650266	TDB4-U207N-Lr 0-10s (5s) 36VDC	To be defined
TDB4-U207-C 15s 36V code BT	330650262	TDB4-U207N-Lr 15s 36VDC code BT	To be defined
TDB4-U207-C 0-30s (15s) 36V	330650256	TDB4-U207N-Lr 0-30s (15s) 36VDC	To be defined
TDB4-U207-C 2min 36V	330650255	TDB4-U207N-Lr 2min 36VDC	To be defined
TDB4-U207-C 30min 36V code BV	330650264	TDB4-U207N-Lr 30min 36VDC code BV	To be defined
TDB4-U207-C 30min 36V	330650257	TDB4-U207N-Lr 30min 36VDC	To be defined
TDB4-U207-C 3min 36V	330650254	TDB4-U207N-Lr 3min 36VDC	To be defined
TDB4-U207-C 5min 36V	330650258	TDB4-U207N-Lr 5min 36VDC	To be defined
TDB4-U207-C 5min 36V code BU	330650263	TDB4-U207N-Lr 5min 36VDC code BU	To be defined
TDB4-U210-E 0,6-6s 120 V	330651152	TDB4-U210N-ELr 0-6s 120VDC	To be defined
TDB4-U210-E 0-30min 120 V	330651159	TDB4-U210N-ELr 0-30min 120VDC	To be defined
TDB4-U210-E 0-60s 120V	330651155	TDB4-U210N-ELr 0-60s 120VDC	To be defined
TDB4-U215 0,6-6s 220 V	330650902	TDB4-U215N-Lr 0-6s 220VDC	To be defined

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Mors Smitt
A Wabtec Company

/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

TDB4-U200

Timer relay
Part of D-platform

Description

Plug-in electronic railway timer relay with four change-over contacts. When the relay is activated there is a delay on pull-in. The delay time is adjustable with a lockable knob. The relay can also be supplied with a fixed time delay (no knob).

The relay is equipped with two LEDs which indicate the presence of power supply and the energizing of the coil. Also standard equipped with magnetic arc blow-out for high breaking capacity and long contact life.

The construction of the relay and choice of materials makes the TDB4-U200 relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments.

No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

Compact design, choice of many options and a wide range of sockets makes the TDB4-U200 relay an easy and flexible solution to use

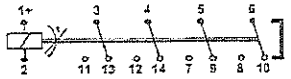
Application

These relays are designed for demanding rolling stock applications. The TDB4-U200 is used in applications where a time delay is necessary after activating the relay.

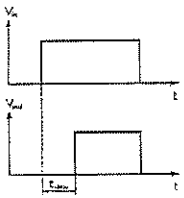
Features

- Time delay relay, delay on pull-in
- Compact plug-in design
- 4 C/O contacts
- Delay time adjustable with a lockable knob
- Also available with fixed time delay
- Magnetic arc blow-out
- Two LEDs for status indication
- Flat, square and silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock
- Transparent cover
- Optional positive mechanical keying relay to socket

Connection diagram



Timing diagram



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	IEC 60947-5-4

Mors Smitt
A Wabtec Company

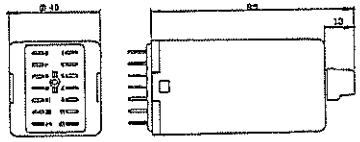
Timer relay
TDB4-U200

Options

- Low temperature (-40 °C), max. contact current 6 A
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode
- Double make/double break contacts

Remark: Not all combinations possible

Dimensions (mm)



Sockets

		Mounting			
		Surface/Width 35 mm rail		Panel/Push-in	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmit.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Technical specifications

Time delay characteristics

Time delay function Available time ranges, adjustable (xx)	Delay on pull-in 0.1...1 s 1...10 s 0.3...3 min 3...30 min	0.3...3 s 3...30 s 0.6...6 min 6...60 min	0.6...6 s 6...60 s 1...10 min
Accuracy - adjustment	≤10 % of full scale After adjusting/fixed time setting: no variation in setpoint		
Accuracy - repeatability	< 0.5 %		
Time variation vs. voltage variation vs. temperature variation	± 0.05 % / % Uнom ± 0.02 % / K		
Pull-in time	Depending on pull-in time setting (xx)		
Recovery time	± 0.1%		
Release time	< 30 ms		
Maximum permissible ripple	50 %		

Example time delay : Time range 0.3...3 s
Time delay set on 2 s : delay will be between 1.7 s...2.3 s
For example: 2.0 s. The ambient temperature is 40 degrees Celsius which is 20 degrees different compared to the standard 20 degrees Celsius. This results in 0.4 % extra time variation. The applied voltage is 30% lower than the nominal voltage. This results in 1.5 % extra time variation. The total maximum time variation is then 0.5 % (repeatability) + 0.4 % (temperature variation) + 1.5 % (voltage variation) = 2.4 %. In this case every new pulse will be between 1.95 s and 2.05 s.

Coil characteristics

Operating voltage range		0.7...1.25 Unom
Nominal power consumption	During time delay	< 0.675 W (220 V) < 0.375 W (110 V) Lower voltage = lower power
	After time delay	< 3.6 W (220 V) < 3 W (110 V) Lower voltage = lower power

Type	Unom (VDC)	Umin (VDC)	Umax (VDC)	Urelease (VDC)
TDB4-U201-xx	24	16.8	30	2.4
TDB4-U202-xx	48	33.6	60	4.8
TDB4-U203-xx	72	50.4	90	7.2
TDB4-U204-xx	110	77.0	138	11.0
TDB4-U205-xx	96	67.2	120	9.6
TDB4-U207-xx	36	25.2	45	3.6

Other types on request

Remarks:
- Umin is the maximum voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage
- Udropout is the maximum voltage at which the relay has dropped-out in all circumstances (worst-case situation), in practice the relay drops out at a higher voltage (Urelease)
- To reset the time function, the voltage must drop below Udrop-out
- Always select the nominal voltage as close as possible to the actual voltage in the application

Contact characteristics

Amount and type of contacts		4 C/O
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min) 80 A (withstand > 10 x 80 A @ 200 ms, 1 min) 40 A (withstand > 10 x 40 A @ 500 ms, 1 min) 30 A (withstand > 10 x 30 A @ 1000 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	IEC 60255-5	Pole-pole	4 kV, 50 Hz, 1 min
	IEC 60077	Coil-coil	2.5 kV, 50 Hz, 1 min
		Open contacts	2.5 kV, 50 Hz, 1 min
Pulse withstanding		IEC 60255-5	5 kV (1.2/50 µs)
EMC			EN 50121-3-2 compliant

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Torque value screw to lock knob	0.2-0.4 Nm
Weight	180 g (without options)

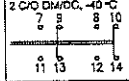
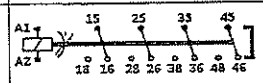
Environmental characteristics

Environmental	EN 50125-1 and IEC 60077-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (optional: -40 °C)
Humidity	95%
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class 4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (With option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

Options

Code	Description	Remarks	Contact material combined with E*
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	M
E*	Au; Gold plated contacts (10 µm)		
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket, Application PD1/PD2 and contact load > 0,5 A.	
N	No magnetic arc blow-out		
O	Double zener diode over coil	Maximum allowed peak voltage 180 V, higher voltage will damage the diode	
Y	Double make/double break contacts	2 C/O DM/DC, -40 °C 	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E
X6	DIN marking	 Numbering relay bottom side standard (no DIN) marking	

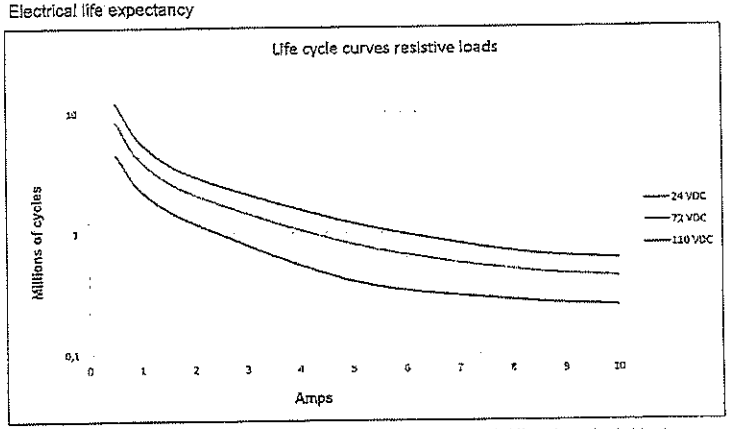
* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0,33 Hz.

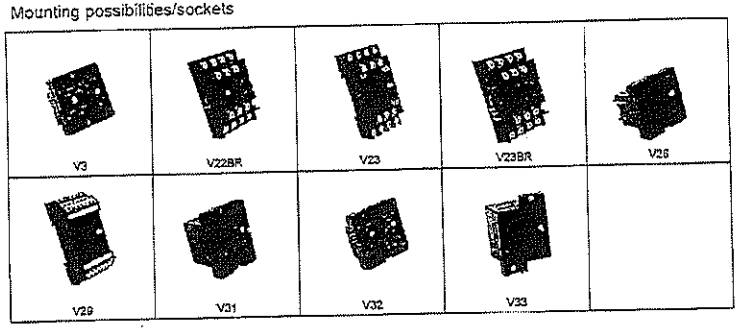
Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0,5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0,5 A

For other contact loads: contact Mors Smitt.

Mounting possibilities/sockets



Surface/wall mounting		
338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7,5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2,5 mm²)

Rail mounting		
338000580	V23	Screw socket, rail mount, front connection (7,5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2,5 mm²)

Panel/flush mounting		
338100100	V3	Solder lug socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A250 crimp contact
338000560	V31	Fasion connection socket, rear dual connection (4,8 x 0,8 mm)
338000670	V33	Push-in terminal socket, panel mount, rear dual connection (3,3 mm²)

PCB mounting		
338000561	V32	PCB soldering socket

No external retaining clip needed as the "snap-lock" will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

Mors Smitt
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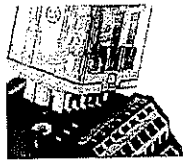
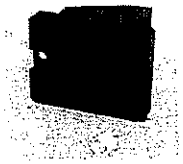
Timer relay
TDB4-U200

Mechanical keying relay and socket (optional)



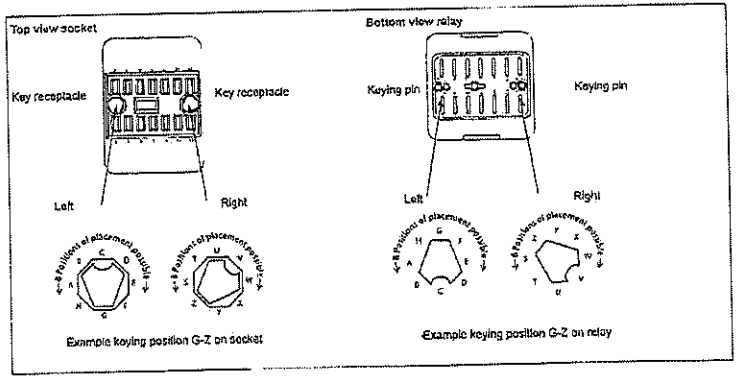


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



TMT PART & SERVICE CO.,LTD.
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Mors Smitt
A Wabtec Company

Timer relay
TDB4-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

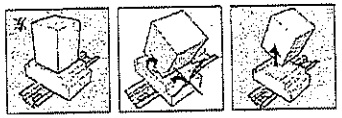
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smit Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail. Torque value screw to lock knob: 0.2-0.4 Nm

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smit for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

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Timer relay
TDB4-U200

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smit Relay Tester. More information on: www.morssmit.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmit.com

Ordering scheme

TDB4-U [ ] - [ ] [ ]

Coil voltages

201	24 VDC
207	36 VDC
202	48 VDC
203	72 VDC
205	96 VDC
204	110 VDC

Options
(add as many options as needed)

C	Low temperature (-40 °C) – Max contact current 8 A	M
E	Gold plated contacts	T
K	Extra dust protection, IP50	
N	No magnetic arc blow-out	
Q	Double zener diode	
V	Double make/double break (CY -40 °C)	

Special options
(minimum order quantity: 20)

M	AgSnO2 contacts, highly resistant to welding	E
X0	Din marking	

Time ranges Delay-on and Delay-off

0.1...1 s	
0.1...3 s	
0.6...6 s	
1...10 s	
3...30 s	
6...60 s	
0.3...3 min	
0.5...6 min	
1...10 min	
3...30 min	
6...60 min	
Fixed	No knob

Examples:

TDB4-U204-C 1-10 s
Description: TDB4-U204 relay, Unom 110 VDC, low temperature (-40 °C), with time range 1...10 s

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Timer relay
TDB4-U200

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Classic product Description TDE4N-U series	Part number U series	New product Description TDE4N-UN series	Part number UN series
TDE4N-U 72-230VAC/DC 0-100s (30s)	330690089	TDE4N-UN 72-230VAC/DC LrX2 0-100s (30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s (45s)	330690062	TDE4N-UN 72-230VAC/DC LrX2 0-100s (45s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s code EX	330690090	TDE4N-UN 72-230VAC/DC LrX2 0-100s code EX	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(100s)	330690178	TDE4N-UN 72-230VAC/DC LrX2 0-100s(100s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(10s)	330690029	TDE4N-UN 72-230VAC/DC LrX2 0-100s(10s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(15s)	330690002	TDE4N-UN 72-230VAC/DC LrX2 0-100s(15s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(30s)	330690001	TDE4N-UN 72-230VAC/DC LrX2 0-100s(30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(35s)	330690179	TDE4N-UN 72-230VAC/DC LrX2 0-100s(35s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(40s)	330690082	TDE4N-UN 72-230VAC/DC LrX2 0-100s(40s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(60s)	330690000	TDE4N-UN 72-230VAC/DC LrX2 0-100s(60s)	To be defined
TDE4N-U 72-230VAC/DC C 0-100s(90s)	330690014	TDE4N-UN 72-230VAC/DC LrX2 0-100s(90s)	To be defined
TDE4N-U 72-230VAC/DC 0-10s	330690007	TDE4N-UN 72-230VAC/DC LrX2 0-10s	To be defined
TDE4N-U 72-230VAC/DC C 0-10s	330690028	TDE4N-UN 72-230VAC/DC LrX2 0-10s	To be defined
TDE4N-U 72-230VAC/DC C 0-10s (10s)	330690041	TDE4N-UN 72-230VAC/DC LrX2 0-10s (10s)	To be defined
TDE4N-U 72-230VAC/DC 0-10s (6s)	330690058	TDE4N-UN 72-230VAC/DC LrX2 0-10s (6s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s (6s)	330690026	TDE4N-UN 72-230VAC/DC LrX2 0-10s (6s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(1,5s)	330690098	TDE4N-UN 72-230VAC/DC LrX2 0-10s(1,5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(1s)	330690010	TDE4N-UN 72-230VAC/DC LrX2 0-10s(1s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(2.5s)	330690030	TDE4N-UN 72-230VAC/DC LrX2 0-10s(2,5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(2s)	330690017	TDE4N-UN 72-230VAC/DC LrX2 0-10s(2s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(3s)	330690018	TDE4N-UN 72-230VAC/DC LrX2 0-10s(3s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(4s)	330690023	TDE4N-UN 72-230VAC/DC LrX2 0-10s(4s)	To be defined
TDE4N-U 72-230VAC/DC C 0-10s(5s)	330690019	TDE4N-UN 72-230VAC/DC LrX2 0-10s(5s)	To be defined
TDE4N-U 72-230VAC/DC 0-180s	330690035	TDE4N-UN 72-230VAC/DC LrX2 0-180s	To be defined
TDE4N-U 72-230VAC/DC C 0-180s (180s)	330690193	TDE4N-UN 72-230VAC/DC LrX2 0-180s (180s)	To be defined
TDE4N-U 72-230VAC/DC 0-1s	330690037	TDE4N-UN 72-230VAC/DC LrX2 0-1s	To be defined
TDE4N-U 72-230VAC/DC C 0-1s(0.3s)	330690033	TDE4N-UN 72-230VAC/DC LrX2 0-1s(0,3s)	To be defined
TDE4N-U 72-230VAC/DC 0-30s	330690004	TDE4N-UN 72-230VAC/DC LrX2 0-30s	To be defined
TDE4N-U 72-230VAC/DC C 0-30s	330690008	TDE4N-UN 72-230VAC/DC LrX2 0-30s	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (15s)	330690011	TDE4N-UN 72-230VAC/DC LrX2 0-30s (15s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (30s)	330690032	TDE4N-UN 72-230VAC/DC LrX2 0-30s (30s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (4s)	330690186	TDE4N-UN 72-230VAC/DC LrX2 0-30s (4s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s (5s)	330690048	TDE4N-UN 72-230VAC/DC LrX2 0-30s (5s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s(10s)	330690024	TDE4N-UN 72-230VAC/DC LrX2 0-30s(10s)	To be defined
TDE4N-U 72-230VAC/DC C 0-30s(3s)	330690020	TDE4N-UN 72-230VAC/DC LrX2 0-30s(3s)	To be defined
TDE4N-U 72-230VAC/DC C 0-3s	330690049	TDE4N-UN 72-230VAC/DC LrX2 0-3s	To be defined

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ราคาตรงที่ 8

รายการที่ 8

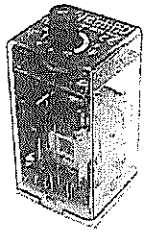
Mors Smitt
A Wabtec Company

/// Plug-in timer relay, delay-off with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

TDE4N-U

Timer relay, delay-off
Part of D-platform



Description

Plug-in electronic railway timer relay with four change-over contacts. When the relay is de-energized there is a delay on drop-out without any auxiliary power supply. The delay time is adjustable with a lockable knob. The relay can also be supplied with a fixed time delay (no knob)

The relay is equipped with a LED which indicates the presence of energizing voltage. Standard equipped with back EMF suppression and magnetic arc blow-out for high breaking capacity and long contact life.

The construction of the relay and choice of materials makes the TDE4N-U relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments.

No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions. Compact design, choice of many options and a wide range of sockets makes the TDE4N-U relay an easy and flexible solution to use.

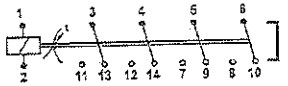
Application

These relay series are designed for demanding rolling stock applications. The TDE4N-U is used in applications where a time delay on drop-out is necessary after de-energizing the relay, without using auxiliary supply

Features

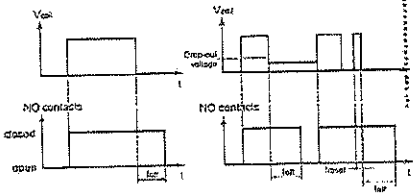
- Time delay relay
- Delay on drop-out (without auxiliary power supply)
- Compact plug-in design
- 4 C/O contacts
- Delay time adjustable by lockable knob
- Also available with fixed time delay
- Total time delay range: 0 s...180 s
- Magnetic arc blow-out
- Back EMF suppression
- One LED for voltage presence
- Suitable for AC and DC voltage
- Flat, square and silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock

Connection diagram



Please note the relay will leave production in open state (with open armature) with all contacts in the position shown in the connection diagram. Due to severe shocks far exceeding maximum levels mentioned in IEC 61373 (Category I, Class B, Body mounted), it can happen the armature closes and stay closed. Therefore after installation all relays must be checked on correct state of the contacts and apply rated voltage to the coil to check correct operation.

Timing diagrams



Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 61373	NF F 62-002
IEC 60947-5-4	

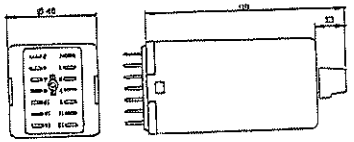
Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Options

- Low temperature (-40 °C)
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double make / double break contacts (-40 °C)

Dimensions (mm)



Sockets

Terminal connection	Mounting: Surface /Wall	DIN rail/mini rail	Rapid / Flash	PCB
Screw	V23	V23	-	-
Screw - wide terminals	V22 BR	V23 BR	-	-
Spring clamp	V20	V29	V33	-
Faston	-	-	V31	-
Crimp	-	-	V26	-
Solder lug	-	-	V3	-
PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Technical specifications

Time delay characteristics

Time delay function		Delay on drop-out (without auxiliary power supply), delay starts when drop-out value is reached.
Available time ranges	Fixed	Any value between 0...180 s with resolution of 0.1 s
	Adjustable*	0...1 s 0...3 s 0...6 s 0...10 s 0...30 s 0...60 s 0...100 s 0...180 s Other time ranges on request
Accuracy	Adjustment	< 10 % of full scale After adjusting / fixed time setting: no variation in setpoint
	Repeatability	Fixed: 1 % of fixed value Adjustable: 1 % of full scale value
Time variation	vs. voltage variations	± 0.1 % / % U_{nom} of set value ± 50 ms
	vs. temperature variation	± 0.02 % / K of set value
Recovery time		0 s
Pull-in time		< 100 ms
Release time		Depending on drop-out time setting

Example time delay : Time range 0 - 3 s. Time delay manually set on 2 s : delay will be between 1.7 s - 2.3 s.
For example: 2.0 s, accuracy due to repeatability, voltage and temperature variation:
The ambient temperature is 30 °C which is 10 degrees different compared to the standard 20 °C. This results in 0.2 % extra time variation. The applied voltage is 15 % lower than the nominal voltage. This results in 1.5 % extra time variation. The total maximum time variation is:
1.0 % (repeatability) x 3 = 0.03 s
+ 0.2 % (temperature variation) x 2 = 0.04 s
+ 1.5 % (voltage variation) x 2 = 0.03 s
= 0.10 s
In this case every new delay time will be between 1.90 s and 2.10 s.

Remarks:
- Inside the TDE4N is a bistable relay controlled by electronics: the relay can stay in energized mode after removing the control voltage in case the electronics are damaged (e.g. due to a power surge)
- For safety-critical applications we recommend the TDB64 relay, which doesn't use a bistable relay inside

Coil characteristics

Minimum operate pulse time	100 ms
Operating voltage range	DC: 0.7-1.25 U_{nom}, AC: 0.8-1.20 U_{nom} (50 Hz and 60 Hz)
Guaranteed drop-out voltage	9 V (24-60 V version), 23 V (72-230 version)
Nominal current	< 3 mA (24-60 V version), < 2 mA (72-230 V version)
Inrush current (< 100 ms)	< 750 mA (24-60 V version), < 350 mA (72-230 V version)
Reset internal timer when delay-off is activated - Minimum reset pulse, t_{reset}, adjustable - Minimum reset pulse, t_{reset}, fixed	0.1 % of time range + 20 ms 0.2 % of time range + 20 ms

	U_{nom} (VDC)	U_{min} (VDC)	U_{max} (VDC)	U_{min} (VAC)	U_{max} (VAC)
TDE4N-U	24-60	19.2	16.8	72	75
	72-230	57.6	50.4	276	287.5

Remarks:
- U_{min} is the must-operate voltage at which the relay has picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage

Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.

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Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Contact characteristics

Amount and type of contacts		4 C/O
Maximum make current		18 A
Peak inrush current	NF F 62-002	200 A (withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional $AgSnO_2$, Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	Pole-pole, IEC 60255-5	4 kV, 50 Hz, 1 min
	Coil-coil, IEC 60077	2.5 kV, 50 Hz, 1 min
	Open contacts	2.5 kV, 50 Hz, 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)
EMC	EN 50121-3-2 compliant	

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Torque value screw to lock knob	0.2-0.4 Nm
Weight	150 g (without options)

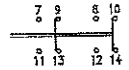
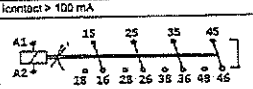
Environmental characteristics

Environmental	EN 50125-1 and IEC 60071
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (with option C: -40 °C)
Humidity	93%
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for example 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R25
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947-5-4	Railway applications - Electromechanical components for control applications. This standard examines both coil and contact specifications in depth.
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

Options

Code	Description	Remark	Contact set switched via
Standard options:			
C	Low temperature (-40 °C)	Iccontact < 8 A	M
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification	
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PO1/PO2 and contact load > 0.5 A.	
N	No magnetic arc blow-out		
Y	Double make/double break contacts	2 C/O DM/DB, -40 °C 	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$, "non-weldable" contacts	Iccontact > 100 mA	m
X8	DIN marking	 Numbering relay bottom side standard (no DIN) marking	

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Mors Smitt
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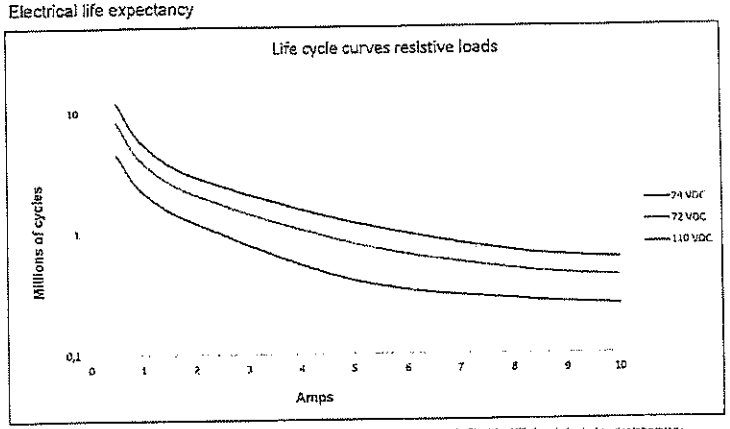
Timer relay
TDE4N-U

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

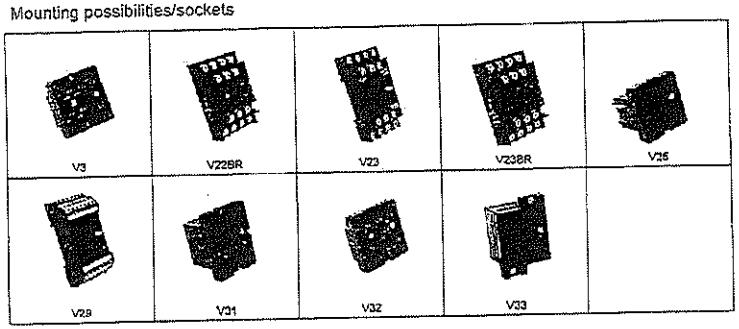
Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	30 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

Mounting possibilities/sockets



Surface/wall mounting		
338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7,5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting		
338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting		
338100100	V3	Solder lug socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A250 crimp contact
338000580	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000670	V33	Push-in terminal socket, panel mount, rear dual connection (3.3 mm²)

PCB mounting		
338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

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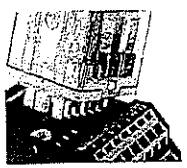
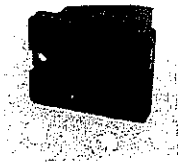
Timer relay
TDE4N-U

Mechanical keying relay and socket (optional)



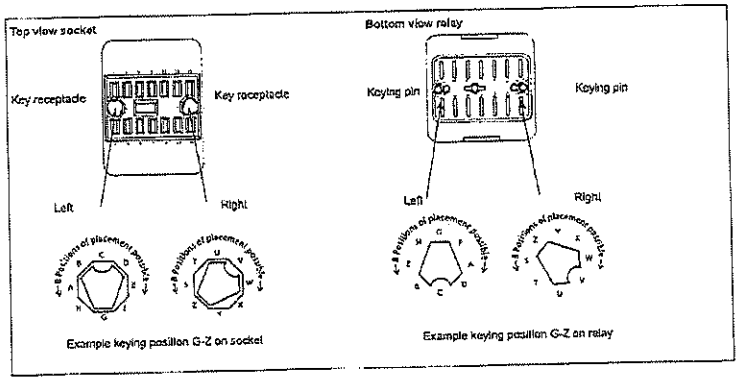


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



Keying codes

	Coil voltage code	
	24-60 V	24-230 V
Silver contacts (standard)	AS	AU
Gold contacts (option E)	DT	AZ
Silver tin oxide (option M)	GT	GV

Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

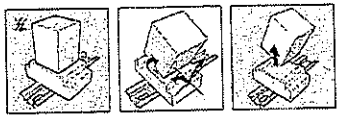
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail. Torque value screw to lock knob: 0,2-0,4 Nm.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & – 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

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Timer relay
TDE4N-U

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

Mors Smitt
A Wabtec Company

Timer relay
TDE4N-U

Ordering scheme

TDE4N-U [ ] [ ] [ ] code [ ]

			Cannot be combined with
Coil voltages	24-60 VAC/DC		
	72-230 VAC/DC		
Options (add as many options as needed)	C	Low temperature (-40 °C) - Max contact current 8 A	
	E	Gold plated contacts	M
	K	Extra dust protection, IP50	
	N	No magnetic arc blow-out	
	Y	Double make / double break contacts	
Special options (minimum order quantity: 20)	M	AgSnO2 contacts, highly resistant to welding	E
	XB	DIN marking	
Time ranges	0-1 s		
	0-3 s		
	0-6 s		
	0-10 s		
	0-30 s		
	0-60 s		
	0-120 s		
	0-180 s		
	Fixed	Value between 0-180 s, no knob	
Keying code		See table on page 8, leave blank for no keying	

Example: TDE4N-U 72-230 VAC/DC CE 0-10 s
Description: TDE4N-U relay, Uncm: 72-230 VAC/DC, gold plated contacts, low temperature (-40 °C), adjustable delay time 0-10 s, no keying code

Example: TDE4N-U 24-60 VAC/DC Y 120 s AS
Description: TDE4N-U relay, Uncm: 24-60 VAC/DC, double make / double break contacts, fixed time delay time 120 s, keying code AS

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Timer relay
TDE4N-U

Over 10 million Mors Smitt relays in use in rail transport applications worldwide!

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รูปหน้าที่ 9

Mors Smitt
A Wabtec Company

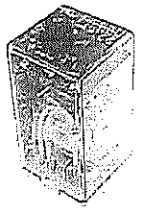
/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

FDA4-U200

Flashing relay

Part of D-platform



Features

- Flashing relay (symmetrical)
- Duty cycle: 50 %
- Compact plug-in design
- 4 C/O contacts
- Fixed pulse rate
- Pulse times between 0.2 s...60 min
- Also available with adjustable pulse rate (with knob)
- Magnetic arc blow-out
- Two LEDs for status indication
- Flat, square and silver plated relay pins for excellent socket connection
- Integrated snap lock
- Optional positive mechanical keying relay to socket

Description

Plug-in electronic railway pulsing relay with four change-over contacts. When the relay is activated the coil starts with an interval. The pulse time and interval time are equal. The relay is supplied with a fixed pulsing frequency. The relay can also be supplied with an adjustable pulsing frequency (relay with knob).

The relay is equipped with two LEDs which indicate the presence of power supply and the energizing of the coil. Also standard equipped with magnetic arc blow-out for high breaking capacity and long contact life.

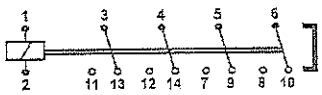
The construction of the relay and choice of materials makes the FDA4-U200 relay suitable to withstand low and high temperatures, shock & vibrating and dry to humid environments. No external retaining clip needed as integrated 'snap-lock' will hold relay into socket under all circumstances and mounting directions.

Compact design, choice of many options and a wide range of sockets makes the FDA4-U200 relay an easy and flexible solution to use.

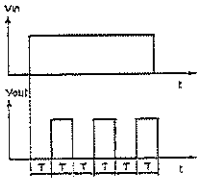
Application

These relay series are designed for demanding train borne applications. The FDA4-U200 is used in applications where a pulse frequency in output is necessary after activating the relay

Connection diagram



Timing diagram



Example:
Pulse frequency: 60 imp/min
T = 0.5 s

Railway compliancy

EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	

Mors Smitt
A Wabtec Company

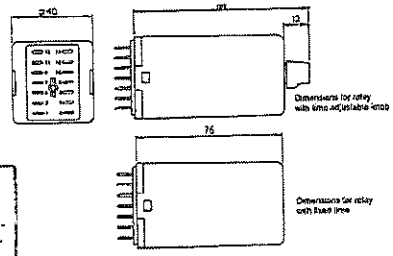
Flashing relay
FDA4-U200

Options

- Low temperature (-40 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection
- $AgSnO_2$ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode over coil
- Keying

Remark: Not all combinations possible

Dimensions (mm)



TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

Sockets

		Mounting			
		Surface / Wall	35mm rail	Panel / Flush	PCB
Terminal connection	Screw	V23	V23	-	-
	Screw - wide terminals	V22 BR	V23 BR	-	-
	Spring clamp	V29	V29	V33	-
	Faston	-	-	V31	-
	Crimp	-	-	V26	-
	Solder tag	-	-	V3	-
	PCB	-	-	-	V32

For more information see the respective datasheets

For more detailed technical specifications, drawings and ordering information, go to the product page on www.morssmitt.com

Over 10 million Mors Smitt relays in use in rail transport applications worldwide

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Technical specifications

Pulse characteristics

Pulse function		Flashing (symmetrical); duty cycle 50 %
Frequency	Fixed pulse (set value in factory)(xx)	Selectable between 300 imp/min and 1480 imp/min
	Adjustable pulse	On request, ratio min:max = 1:3
Accuracy	Set value in factory	< 5 %
	Voltage variation	± 0.05 % / % Unom
	Repeatability	± 0.5 %
	Temperature variation	± 0.02 % / K
Recovery time		± 0.1 s
Release time		< 30 ms
Maximum permissible ripple		50 %

Example
Pulse frequency: 20 - 60 imp/min
Pulse frequency set on 30 imp/min; pulse cycle time is 2,0 s.
The ambient temperature is 40 degrees Celsius which is 20 degrees different compared to the standard 20 degrees Celsius. This results in 0,4 % pulse cycle time variation. The applied voltage is 30 % lower than the nominal voltage. This results in 1,5 % extra time variation. The total time variation is then 0,5 % (repeatability) + 0,4 % (time variation) + 1,5 % (voltage variation) = 2,4 %. In this case the pulse cycle time will be between 1,95 s and 2,05 s.

Coil characteristics

Operating voltage range		0.7...1.25 Unom
Nominal power consumption	During time delay	< 0,675 W (220 V) < 0,375 W (110 V) Lower voltage = lower power
	After time delay	< 3,6 W (220 V) < 3 W (110 V) Lower voltage = lower power

TYPE	Unom (VDC)	Umin (VDC)	Umax (VDC)
FDA4-U201-xx	24	16.8	30
FDA4-U202-xx	48	33.6	60
FDA4-U203-xx	72	50.4	90
FDA4-U204-xx	110	77.0	138
FDA4-U205-xx	96	67.2	120
FDA4-U207-xx	36	25.2	45

Other types on request

Remarks:
- Umin is the must-operate voltage at which the relay are picked up in all circumstances (worst-case situation), in practice the relay picks up at a lower voltage
- Udrop-out is the must-release voltage at which the relay has dropped-out in all circumstances (worst-case situation), in practice the relay drops out at a higher voltage (Uhysteresis)
- To reset the time function, the voltage must drop below Udrop-out
- Always select the nominal voltage as close as possible to the actual voltage in the application

Remark: In June 2019 the coil tape color is changed to yellow. This change has no effect on any of the relay specifications or technical performance.

Mors Smitt
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Flashing relay
FDA4-U200

Contact characteristics

Amount and type of contacts		4 C/O
Maximum make current		18 A
Peak inrush current	NF F 62-002	200 A withstand > 10 x 200 A @ 10 ms, 1 min)
Maximum continuous current		10 A
Maximum switching voltage		250 VDC, 440 VAC
Minimum switching voltage		12 V
Minimum switching current		10 mA
Maximum breaking capacity (> 50.000 operations)		72 VDC, 5 A (L/R ≤ 40 ms) 110 VDC, 10 A (resistive load) 110 VDC, 0.5 A (L/R ≤ 40 ms)
Contact resistance		15 mΩ (initial)
Material		Ag standard (optional AgSnO$_2$ Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength	Pole-pole	4 kV, 50 Hz, 1 min
	Cont-coil	2kV, 50 Hz, 1 min
	Open contacts	2,5 kVt 50 Hz, 1 min
Pulse withstanding	IEC 60255-5	5 kV (1,2/50 µs)

Mechanical characteristics

Mechanical life	30 x 10^6 operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Weight	100 g (without options)

Environmental characteristics

Environmental	EN 50125-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C (optional: -40 °C)
Humidity	95% (condensation is permitted temporarily)
Maximum altitude	2000 meter. Higher altitudes are possible but have consequences mentioned in IEC 60664 (for exemple 5000 meter with bigger clearance distance)
Salt mist	IEC 60068-2-11, class ST4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket) (with option K: IP50)
Fire & smoke	NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials	Cover: polycarbonate Base: polyester

Railway compliancy

EN 50155	Railway applications - Rolling stock - Electronic equipment
IEC 60571	Railway applications - Electronic equipment used on rolling stock
IEC 60077	Railway applications - Electric equipment for rolling stock
IEC 60947	Low-voltage switchgear and controlgear
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
EN 50121	Railway applications - Electromagnetic compatibility
NF F16-101/102	Railway rolling stock - Fire behavior
EN 45545-2	Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components
NF F 62-002	Railway rolling stock - On-off contact relays and fixed connections

Options

Code	Description	Remark	Cannot be combined with:
Standard options:			
C	Low temperature (-40 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)	Yellow tape around relay for identification	M
K	Extra dust protection	IP50 Cat 2 for the relays mounted in a Mors Smitt socket. Application PD1/PD2 and contact load > 0.5 A	
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Max. allowed peak voltage180 V, higer voltage will damage the diode	
Keying	Coil coding relay and socket		
Special options:			
M	$AgSnO_2$; "non-weldable" contacts	Icontact > 100 mA	E

* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA

Remark: For application support or technical product support, contact your local Mors Smitt sales office (see contact details on last page).

Mors Smitt
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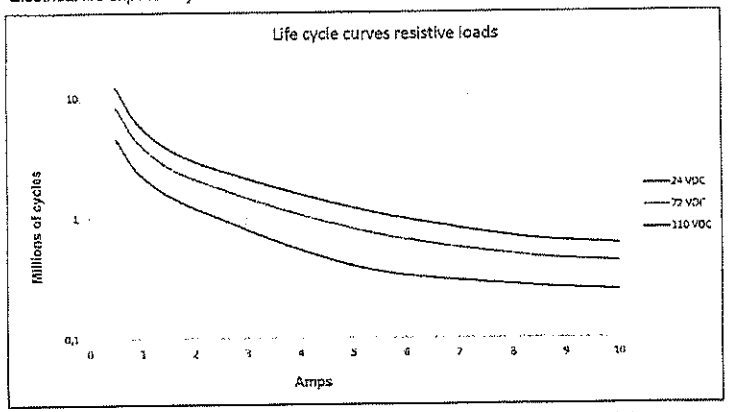
Flashing relay
FDA4-U200

Electrical life expectancy



By connecting 2 contacts in series the DC current breaking capacity is increased by 50 %. Electrical lifetime is tested under laboratory conditions with switching frequency 0.33 Hz.

Note: The actual electrical lifetime in the application is affected by the switching frequency, type of contact (N/O or N/C), environmental conditions, etc.

Expected electrical lifetime inductive loads:

Inductance	Voltage	% of resistive load	Remark
15 ms	24 VDC	50 %	
15 ms	72 VDC	25 %	Tested up to 8 A
15 ms	110 VDC	20 %	Tested up to 0.5 A
40 ms	24 VDC	10 %	
40 ms	72 VDC	4 %	Tested up to 5 A
40 ms	110 VDC	2 %	Tested up to 0.5 A

For other contact loads: contact Mors Smitt.

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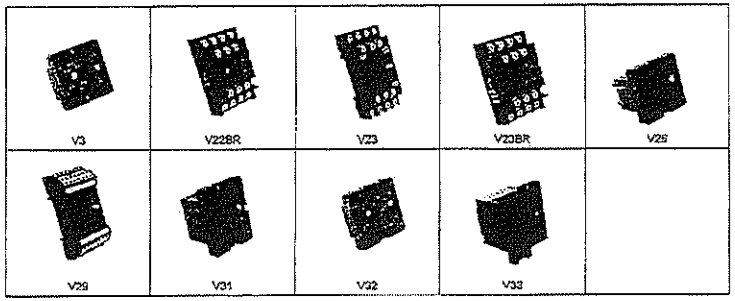
Flashing relay
FDA4-U200

Mounting possibilities/sockets



Surface/wall mounting

338000382	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm²)

Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm²)

Panel/flush mounting

338100100	V3	Solder tag socket, panel mount, rear connection
338400100	V25	Crimp contact socket, panel mount, rear connection, A250 crimp contact
338000560	V31	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm²)

PCB mounting

338000561	V32	PCB soldering socket

No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on www.morssmitt.com

Mors Smitt
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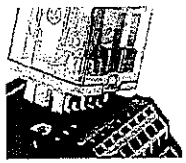
Flashing relay
FDA4-U200

Mechanical keying relay and socket (optional)

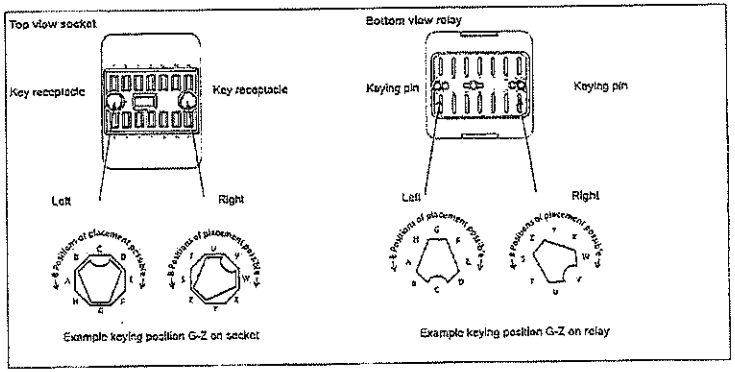


Function:
- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives 8 x 8 = 64 possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



Mors Smitt
A Wabtec Company

Flashing relay
FDA4-U200

Important for relay selection and operation

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

Recommendations for long time contact reliability

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

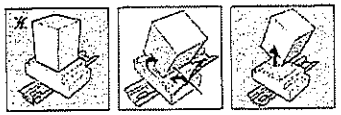
Therefore for long time contact reliability we recommend:
- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

Instructions for use

Installation

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

Warning!
- Never use silicon in the proximity of the relays
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

Operation

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance (≤ 15 mΩ when new). When using silver contacts one can clean the contact by switching a contact load a few times using >24 VDC & ~ 2A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1 Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

Mors Smitt
A Wabtec Company

Flashing relay
FDA4-U200

Inspection / maintenance

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

ต้นฉบับ

Mors Smitt
A Wabtec Company

To Whom It May Concern

Date: October 27th, 2022

Subject: Authorization letter

This letter is to confirm that Barcol-Air (Thailand) Co., Ltd. is authorized to sell Mors Smitt Railway products in Thailand on a non-exclusive base.

This letter will remain valid until December 31, 2024.
Evaluation will take place at the end of each year.

Sincerely yours,
MorsSmitt Asia Limited

Edwin Cremers
General Manager

คณะกรรมการฯ ประกอบด้วย
.....ประธานกรรมการ.....
.....กรรมการผู้แทน.....
.....กรรมการผู้แทน.....
.....กรรมการผู้แทน.....

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

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E sales.mca@wabtec.com · www.morssmitt.com · HSBC Bank No. 004-404-376386-838 · Swift Code: HSBCHKHHHKH

ต้นฉบับ

BARCOL-AIR
(THAILAND) Co., Ltd. บริษัท บาร์โคล-แอร์ (ประเทศไทย) จำกัด

24 1/2 ชั้น 4 ซอยพัฒนาการ 20 ถนนพัฒนาการ แขวงสวนหลวง เขตสวนหลวง กรุงเทพฯ 10250 โทร (+66)0231802389 โทรสาร (+66)0231941227 ต่อ 0

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BA.0009/2566

หนังสือแต่งตั้งตัวแทน

โดยหนังสือฉบับนี้ ข้าพเจ้า นางสาวณิชากร จันทร์สวัสดิ์ กรรมการผู้จัดการ บริษัท บาร์โคล-แอร์(ประเทศไทย) จำกัด ที่อยู่เลขที่ 24 1/2 ชั้น 4 ซอยพัฒนาการ 20 ถนนพัฒนาการ แขวงสวนหลวง เขตสวนหลวง กรุงเทพฯ 10250 ขอแต่งตั้งให้

บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด
175-177 อาคารบางกอกสหประกันภัย ห้องเลขที่ 5 ชั้นที่ 6
ถนนสุรวงศ์ แขวงสุริยวงศ์ เขตบางรัก
กรุงเทพมหานคร 10500
โทร. (02) 237-0889 แฟกซ์. (02) 237-0889

เป็นตัวแทนของ บริษัท บาร์โคล-แอร์(ประเทศไทย) จำกัด ในการจำหน่ายสินค้า ตราอักษร MORS SMITT ให้กับ บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด ตั้งแต่บัดนี้ จนถึง วันที่ 31 ธันวาคม 2566 หากมีการเปลี่ยนแปลงทางบริษัทฯ จะแจ้งเป็นลายลักษณ์อักษรต่อไป

ออกให้ ณ วันที่ 20 กุมภาพันธ์ 2566

ขอแสดงความนับถือ
บริษัท บาร์โคล-แอร์(ประเทศไทย) จำกัด

(นางสาวณิชากร จันทร์สวัสดิ์)
กรรมการผู้จัดการ

BARCOL-AIR
(THAILAND) CO., LTD.

ที่ประชุมกรรมการฯ ประกอบด้วย
.....ประธานกรรมการ.....
.....กรรมการผู้จัดการ.....
.....กรรมการผู้แทน.....
.....กรรมการผู้แทน.....

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

ต้นฉบับ

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ถ. สุราวงศ์ อ.บางรัก กรุงเทพฯ 10500

L159/66

๗ ธันวาคม ๒๕๖๖

เรื่อง ยืนยันราคา Relay สำหรับขบวนรถไฟฟ้า จำนวน ๕ รายการ โดยวิธีเฉพาะเจาะจง
เรียน บริษัท รถไฟฟ้า ร.ฟ.ท. จำกัด
อ้างอิง เอกสารเลขที่ รฟฟท.ศวช.๑๒๐๗๐๗ /๒๕๖๖ ลงวันที่ ๗ ธันวาคม ๒๕๖๖

ตามที่ทางบริษัทฯ ได้เสนอราคา Relay สำหรับขบวนรถไฟ จำนวน ๕ รายการ โดยวิธีเฉพาะเจาะจง ตามเอกสารอ้างอิงข้างต้น ทางบริษัทฯ ขอเรียนให้ท่านทราบว่า ราคาที่ได้เสนอไปนั้น เป็นราคาที่ต่ำสุดแล้ว และไม่สามารถที่จะลดราคาลงมาได้อีก จึงขอยืนยันราคาตามเดิม

จึงเรียนมาเพื่อทราบและโปรดพิจารณา

ขอแสดงความนับถืออย่างสูง

TMT PARTS SERVICE CO.,LTD.
บริษัท ทีเอ็มที พาร์ทแอนด์เซอร์วิส จำกัด

(พิพัฒน์ ประยูรทอง)
กรรมการผู้จัดการ