

## /// Plug-in railway relay with 2 C/O contacts

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

### FDA-U300

Flashing relay  
Part of D-platform



(FDA-U200 shown)

### Description

Plug-in electronic railway pulsing relay with two change-over contacts, suitable for AC coil voltages with a frequency of 50/60 Hz. When the relay is activated the coil starts with an interval. The pulse time and interval time are equal. The pulsing frequency is adjustable with a lockable knob. The relay can also be supplied with a fixed pulsing frequency (no knob). The relay is standard equipped with double zener diode coil protection.

The construction of the relay and choice of materials makes the FDA-U300 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 FDA-U300 relay an easy and flexible solution to use.

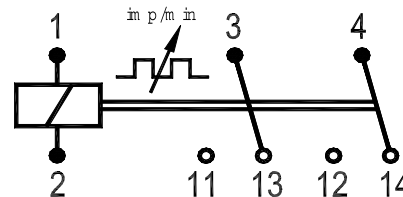
### Application

These relay series are designed for demanding train borne applications. The FDA-U300 is used in applications where a pulse frequency in output is necessary after activating the relay.

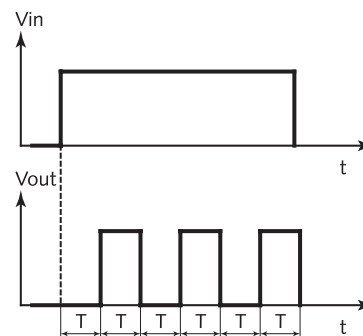
### Features

- Flashing relay (symmetrical)
- Duty cycle: 50 %
- AC input
- Compact plug-in design
- 2 C/O contacts
- Pulse time adjustable with a lockable knob
- Pulse times between 0.5 s - 3 s
- Also available with fixed pulse time (no knob)
- Double zener diode coil protection
- Flat, square and silver plated relay pins for excellent socket connection
- Integrated snap lock
- Optional positive mechanical keying relay to socket

### Connection diagram



### Timing diagram



### Railway compliancy

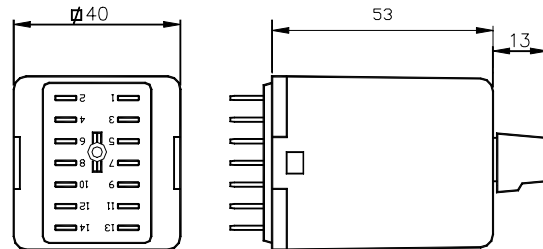
EN 50155	EN 50121
IEC 60571	IEC 60947-5-4
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	

## Flashing relay FDA-U300

### Options

- Low temperature (-40 °C)
- Extra dust protection
- Keying

### 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 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](http://www.morssmitt.com)

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

**Mors Smitt Asia Ltd.**  
 26/F., Casey Aberdeen House  
 38 Heung Yip Road, Wong Chuk Hang  
 Hong Kong  
 Tel: +852 2343 555  
[sales.msa@wabtec.com](mailto:sales.msa@wabtec.com)

**Mors Smitt France SAS**  
 2 Rue de la Mandinière  
 72300 Sablé-sur-Sarthe, France  
 Tel: +33 (0) 243 92 82 00  
[sales.msf@wabtec.com](mailto:sales.msf@wabtec.com)

**Mors Smitt UK**  
 Graycar Business Park,  
 Burton on Trent, DE13 8EN, UK  
 Tel: +44 (0)1283 357 263  
[sales.msuk@wabtec.com](mailto:sales.msuk@wabtec.com)

**Wabtec Netherlands B.V.**  
 Darwinstraat 10  
 6718 XR, Utrecht, Netherlands  
 Tel: +31 (0)88 600 4555  
[sales.msbv@wabtec.com](mailto:sales.msbv@wabtec.com)

**Mors Smitt Technologies Ltd.**  
 1010 Johnson Drive,  
 Buffalo Grove, IL 60089-6918, USA  
[salesmst@wabtec.com](mailto:salesmst@wabtec.com)

**RMS Mors Smitt**  
 19 Southern Court  
 Keysborough, VIC 3173, Australia  
 Tel: +61 (0)3 8544 1200  
[sales.rms@wabtec.com](mailto:sales.rms@wabtec.com)

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## Flashing relay FDA-U300

### Technical specifications

#### Pulse characteristics

Pulse function	Flashing (symmetrical); duty cycle 50 %	
Pulse rate (xx)	2 0...60 imp/min adjustable per lockable knob 40...120 imp/min adjustable per lockable knob Fixed without knob (set in factory)	
Accuracy	Adjustment	< 10 %
	After adjusting / fixed pulsing freq.	No variation in setpoint
	Repeatability	± 0.5 %
	Voltage variation	± 0.05 % / % Unom
	Temperature variation	± 0.02 % / K
Maximum permissible ripple	50 %	
<b>Example</b>		
Pulse time set on 2 s : it will be between 1.8 s...2.2 s		
For example: 2.0 s. The ambient temperature is 40 °C which is 20 degrees different compared to the standard 20 °C. This results in 0.4 % pulse 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 time will be between 1.95 s and 2.05 s.		

#### Coil characteristics

Operating voltage range	0.8...1.2 Unom
-------------------------	----------------

Type	Unom (VAC)	Umin (VAC)	Umax (VAC)
FDA-U301-xx	24	19.2	28.8
FDA-U303-xx	220	176	264
FDA-U305-xx	110	88	132

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
- Always select the nominal voltage as close as possible to the actual voltage in the application

#### Contact characteristics

Amount and type of contacts	2 C/O
Maximum make current	14 A
Maximum continuous current	8 A (AC1 ; IEC 60947)
Maximum switching voltage	300 VDC, 250 VAC
Minimum switching voltage	12 V
Minimum switching current	100 mA
Maximum switching capacity and contact life	See graph page 5
Material	AgCdO

Note : contacts cannot have a different position (Forced contacts, weld-no-transfer)

## Flashing relay FDA-U300

### Electrical characteristics

Dielectric strength	Cont-coil	2.5 kV, 50 Hz, 1 min
Insulation between open contacts		1 kV, 50 Hz, 1 min

### Mechanical characteristics

Mechanical life		20 x 10 <sup>6</sup> operations
Maximum switching frequency		Mechanical: 3600 ops/h Electrical: 1200 ops/h
Torque value screw to lock knob		0.2-0.4 Nm
Weight		90 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%
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
Insulation materials		Cover: polycarbonate Base: polyester

### Railway compliancy

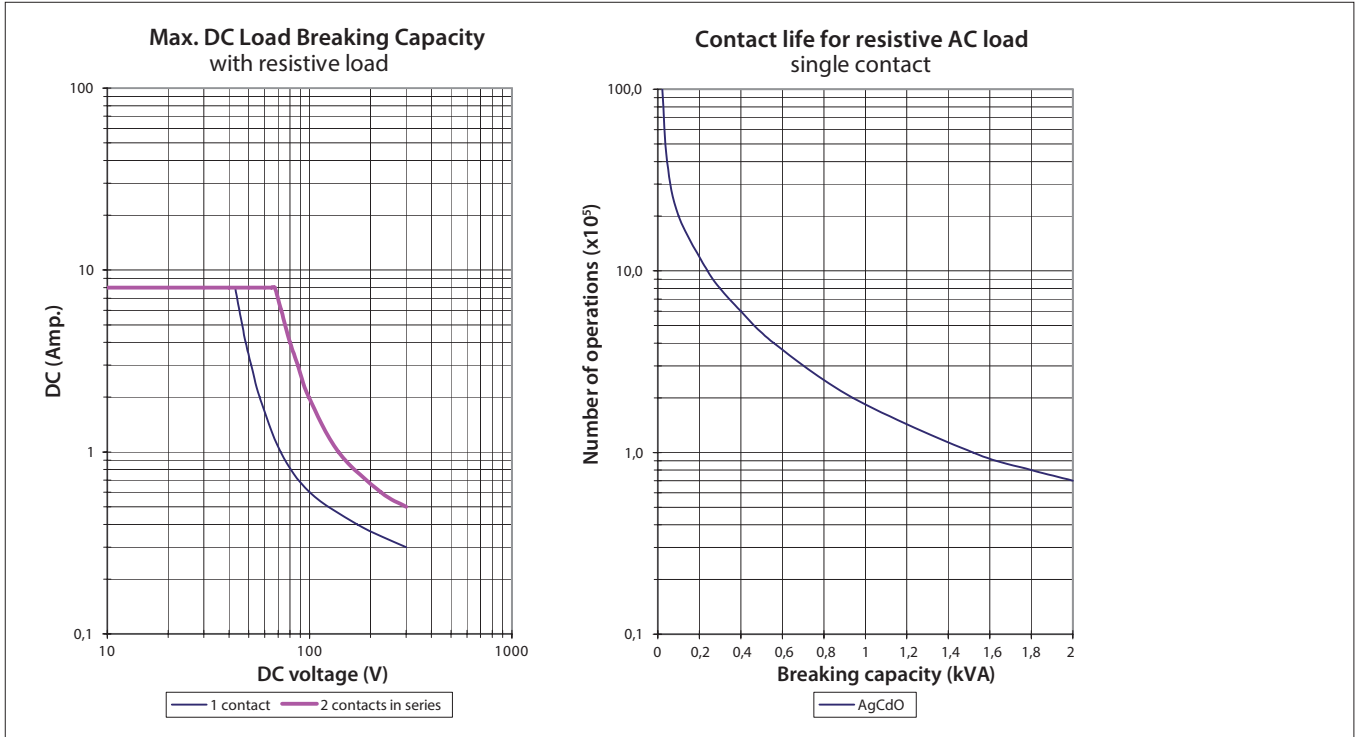
EN 50155		Railway applications - Rolling stock - Electronic equipment
IEC 60571		Railway applications - Electronic equipment used on rolling stock
IEC 60077		Railway applications - Electric equipment for rolling stock
IEC 60947		Low-voltage switchgear and controlgear
IEC 61373		Railway applications - 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	
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.	
Keying	Coil coding relay and socket		

**Flashing relay**  
**FDA-U300**

Maximum switching capacity and contact life



## Flashing relay FDA-U300

### 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 mm <sup>2</sup> )

#### 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 mm <sup>2</sup> )

#### 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)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm <sup>2</sup> )

#### PCB mounting

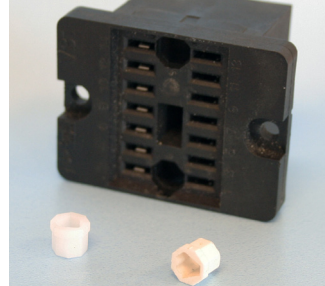
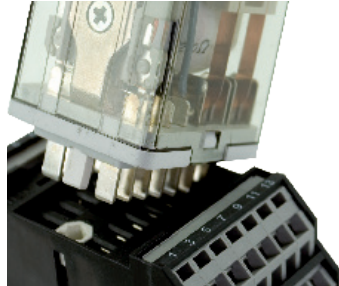
338000561	V32	PCB soldering socket
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No external retaining clip needed as the 'snap-lock' will hold the relay into the socket under all circumstances and mounting directions (according shock & vibration requirements IEC 61373, Category I, Class B, Body mounted). If regulations require external retaining clips, these are available as well.

For more details see datasheets of the sockets on [www.morssmitt.com](http://www.morssmitt.com)

## Flashing relay FDA-U300

### Mechanical keying relay and socket (optional)



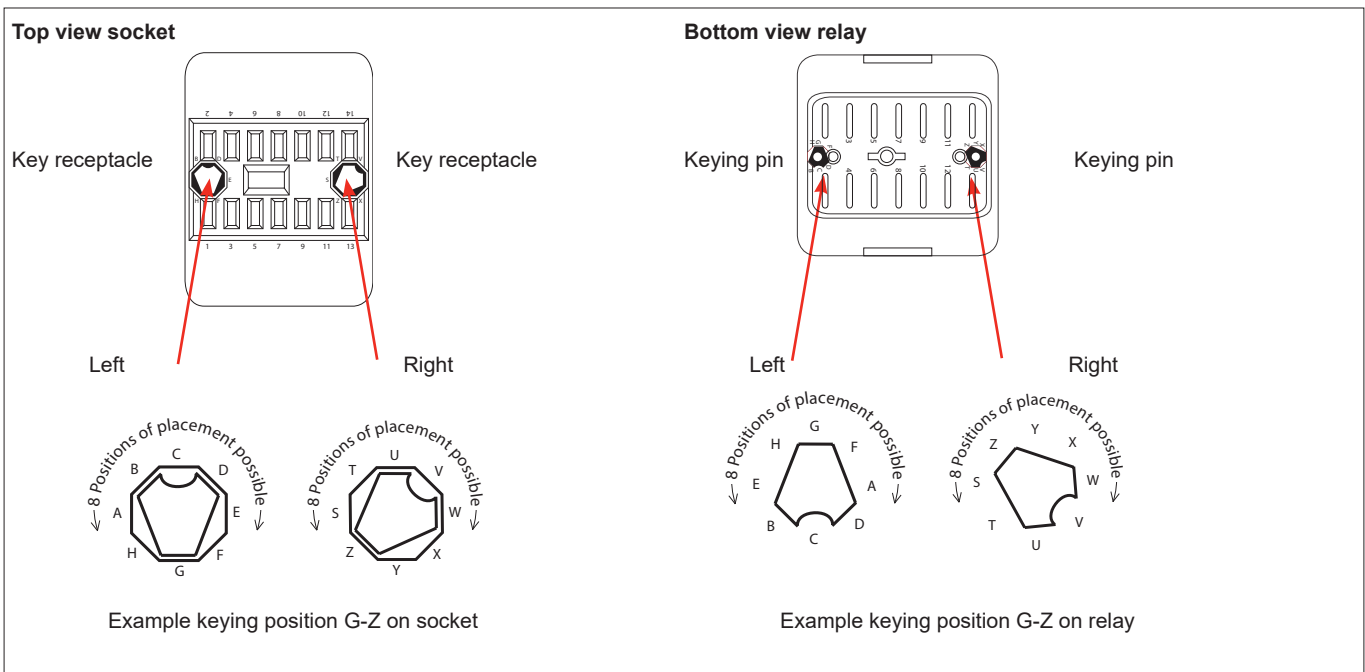
**Function:**

- 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  $8 \times 8 = 64$  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.



## Flashing relay FDA-U300

### 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

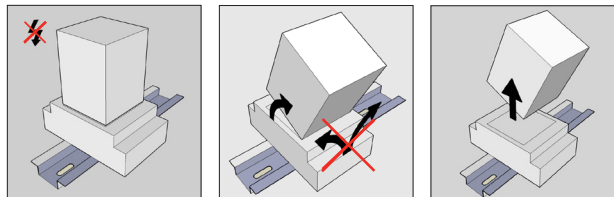
### Instructions for use

#### 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 ( $\leq 15$  m $\Omega$  when new). When using silver contacts one can clean the contact by switching a contact load a few times using  $>24$  VDC &  $\sim 2$  A. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1  $\Omega$  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.



## Flashing relay FDA-U300

### 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](http://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](http://www.morssmitt.com)

## Flashing relay FDA-U300

### Ordering scheme

FDA-U		-		
Coil voltages	<b>301</b>			24 VAC, 50/60 Hz
	<b>303</b>			220 VAC, 50/60 Hz
	<b>305</b>			110 VAC, 50/60 Hz
Options (add as many options as needed)		<b>C</b>		Low temperature (-40 °C) - Max contact current 8 A
		<b>K</b>		Extra dust protection, IP50
Pulse ftime			<b>20-60 imp/min</b>	
			<b>40-120 imp/min</b>	
			<b>Fixed</b>	

Example:

#### FDA-U301-C 40-120

Description: FDA-U300 relay, Unom: 24 VAC, low temperature, 40-120 imp/min

**Flashing relay**  
**FDA-U300**

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**Mors Smitt Asia Ltd.**  
26/F., Casey Aberdeen House  
38 Heung Yip Road, Wong Chuk Hang  
Hong Kong  
Tel: +852 2343 555  
sales.msa@wabtec.com

**Mors Smitt France SAS**  
2 Rue de la Mandinière  
72300 Sablé-sur-Sarthe, France  
Tel: +33 (0) 243 92 82 00  
sales.msf@wabtec.com

**Mors Smitt UK**  
Graycar Business Park,  
Burton on Trent, DE13 8EN, UK  
Tel: +44 (0)1283 357 263  
sales.msuk@wabtec.com

**Wabtec Netherlands B.V.**  
Darwinstraat 10  
6718 XR, Utrecht, Netherlands  
Tel: +31 (0)88 600 4555  
sales.msbv@wabtec.com

**Mors Smitt Technologies Ltd.**  
1010 Johnson Drive,  
Buffalo Grove, IL 60089-6918, USA  
salesmst@wabtec.com

**RMS Mors Smitt**  
19 Southern Court  
Keysborough, VIC 3173, Australia  
Tel: +61 (0)3 8544 1200  
sales.rms@wabtec.com

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