

/// Ultra compact space saving 4-pole relay module

Rugged relay module for extreme reliability, within long endurance applications and harsh environments

D4-U200 relay module

Part of D-platform



Description

The D4-U200 relay module is a form, fit and function solution to replace all kind of contactors with a maximum of 4 contacts. The module consists of a 4-pole relay, spring clamp terminal connections and a housing to fasten the module.

By applying the D4-U200 relay module all specifications of the standard D-U200 relay are valid. The spring clamp connections are made on the front panel by two 5-pole connectors for the contacts and for the relay coil. There are 2 connection points per contact. Several contact combinations are possible such as 0 N/C and 4 N/O, 1 N/C and 3 N/O, 2 N/C and 2 N/O.

Other contact configuration and numbering on request.

Thanks to its small dimensions the module can be fitted in most places where standard contactors are used. The relay module is standard equipped with a LED. The module is non polarity sensitive by use of a rectifier bridge.

The housing is suitable for rail mounting, due to its 35 mm rail connection. It is specially designed for space saving applications.

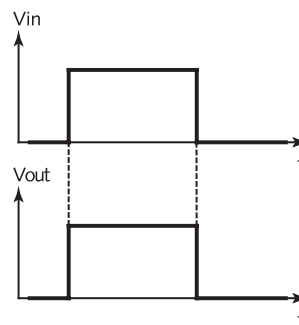
Application

A typical use of the D4-U200 relay module is in a dusty environment where the open construction of a contactor is causing contact problems (dust is gathered between the contacts of the contactor).

Features

- Ultra compact space saving 4-pole relay module
- Easy replacement of 4-pole contactors
- Module consists of 4-pole relay and housing
- Various contact combinations possible
- Many 4-pole Mors Smitt relay configurations are possible
- Non polarity sensitive
- AC/DC coil power supply by rectifier bridge
- Standard back EMF suppression function
- Heavy duty, high VDC switching
- Spring clamp connections
- Terminals at front side
- 35 mm rail mounting

Timing diagram



Options

- Low temperature (-50 °C), max. contact current 8 A
- Gold plated contacts
- Extra dust protection (for relays)
- AgSnO₂ contacts, high resistant to welding
- No magnetic arc blow-out
- Double zener diode

Remark: Not all combinations possible

Railway compliancy

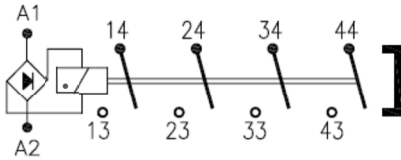
EN 50155	EN 50121
IEC 60571	EN 45545-2
IEC 60077	NF F16-101/102
IEC 60947	NF F 62-002
IEC 61373	



Relay module D4-U200

Connection diagram spring clamp terminal

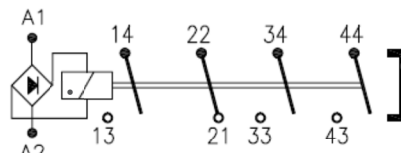
0 N/C - 4 N/O: D4-U204-004



Top view on terminal

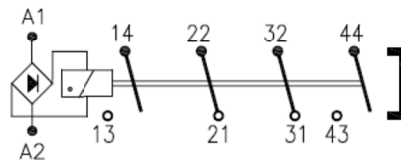
13	23	33	43	A1
NO	NO	NO	NO	
NO	NO	NO	NO	
14	24	34	44	A2

1 N/C - 3 N/O: D4-U204-013



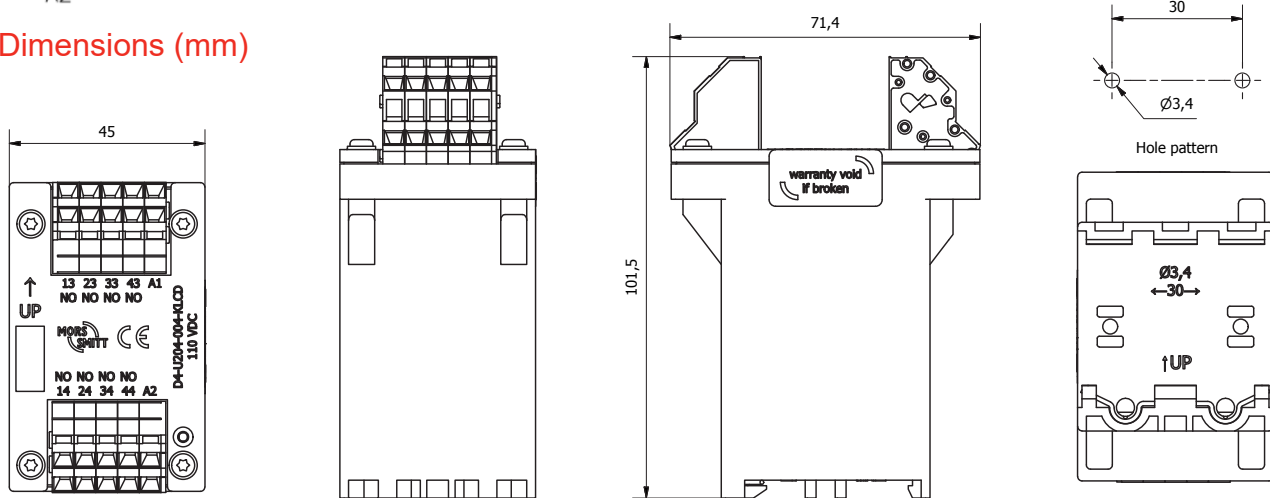
13	21	33	43	A1
NO	NC	NO	NO	
NO	NC	NO	NO	
14	22	34	44	A2

2 N/C - 2 N/O: D4-U204-022



13	21	31	43	A1
NO	NC	NC	NO	
NO	NC	NC	NO	
14	22	32	44	A2

Dimensions (mm)



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!**

Mors Smitt Asia Ltd.
 Unit B & C, 25/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 Ltd.
 Graycar Business Park,
 Burton on Trent, DE13 8EN, UK
 Tel: +44 (0)1283 357 263
sales.msuk@wabtec.com

Wabtec Netherlands B.V.
 Vrieslantlaan 6,
 3526 AA, Utrecht, Netherlands
 Tel: +31 (0)30 288 1311
sales.msbv@wabtec.com

Mors Smitt Technologies Ltd.
 1010 Johnson Drive,
 Buffalo Grove, IL 60089-6918, USA
 Tel: +1 847 777 6497
salesmst@wabtec.com

RMS Mors Smitt
 6 Anzed Court,
 Mulgrave, VIC 3170, Australia
 Tel: +61 (0)3 8544 1200
sales.rms@wabtec.com

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Technical specifications

Relay module D4-U200

Coil characteristics

Operating times at nominal voltage (typical):	
Pull-in time	≤ 20 ms
Release time	≤ 18 ms
Bounce time N/O contacts (increased bounce time at low voltage)	≤ 4 ms
Bounce time N/C contacts	≤ 8 ms
Inductance L/R at Unom (typical):	
Energized	11 ms
Released	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)	Icoil nom (mA)
D4-U201-xxx	24	16.8	30	2.5	270	89
D4-U202-xxx	48	33.6	60	4.8	1103	44
D4-U203-xxx	72	50.4	90	7.2	2406	30
D4-U204-xxx	110	77	137.5	11.0	5330	21
D4-U205-xxx	96	67.2	120	9.5	4400	22
D4-U206-xxx	12	8.4	15	1.2	72	167
D4-U207-xxx	36	25.2	45	3.5	562	64
D4-U210-xxx	120	84	15	12	6160	19
D4-U212-xxx	100	70	45	10	4400	23
D4-U213-xxx	125	87.5	150	12.5	7634	16
D4-U215-xxx	220	154	125	22	21776	10
D4-U220-xxx	250	175	156.25	25	23850	10

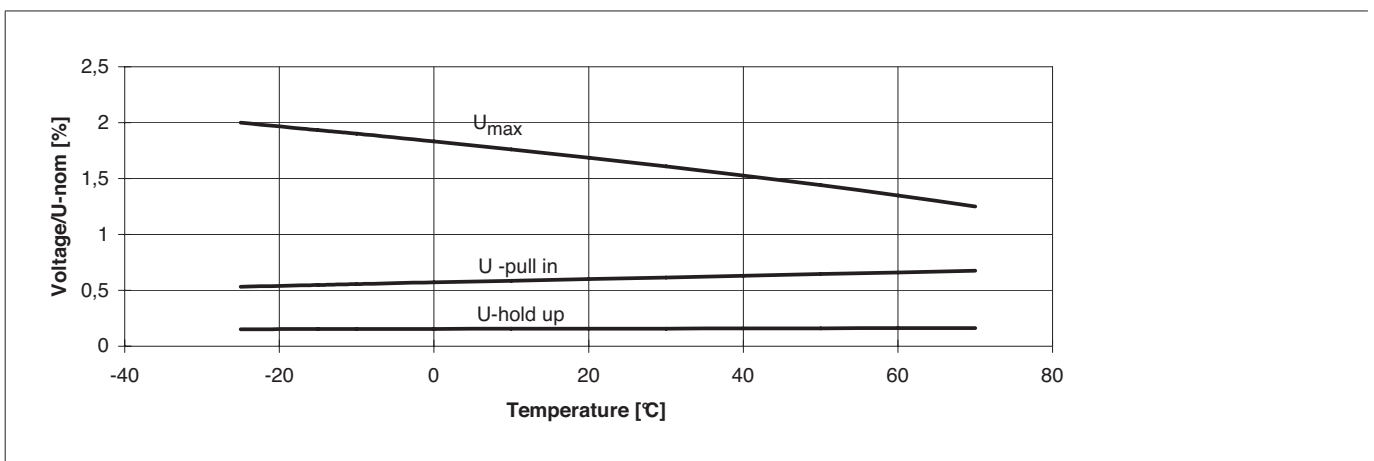
Other types on request

* The Rcoil is measured at room temperature and has a tolerance of ± 10%

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 - instantaneous versions



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.

Relay module D4-U200

Contact characteristics

Amount and type of contacts		0 N/C - 4 N/O, 1 N/C - 3 N/O, 2 N/C - 2 N/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	IEC 60947	10 A for 30 min
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)
Maximum contact resistance		15 mΩ
Material		Ag standard (optional AgSnO ₂ , Au on Ag)
Contact gap		0.7 mm
Contact force		> 200 mN

Electrical characteristics

Dielectric strength EN50155	Pole-pole	IEC 60255-5	4 kV, 50 Hz, 1 min
	Cont-coil	IEC60077	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		241 g

Mounting		Surface / wall and 35 mm rail
Socket terminals		Spring clamp terminal, 2 connection points per contact
Wire size		0.08 - 2.5 mm ²
Wire stripping length		6 mm

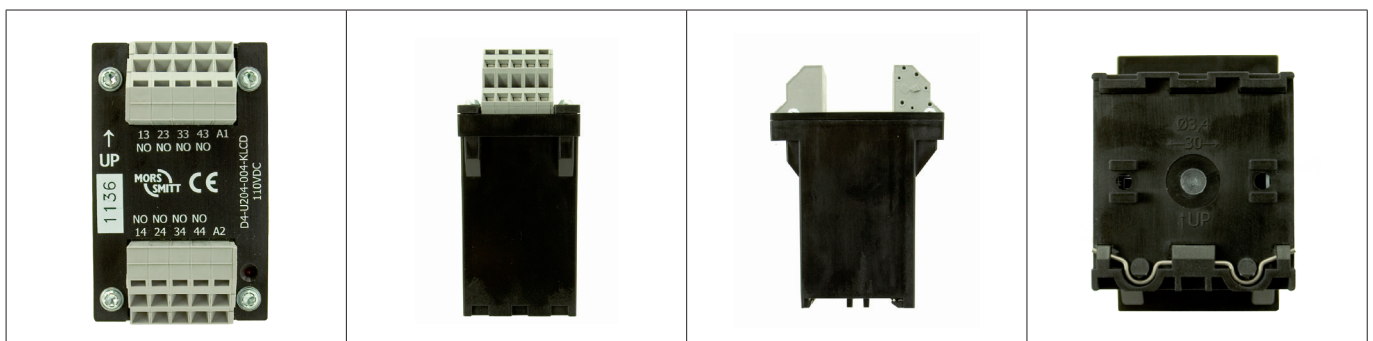
Environmental characteristics

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...+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, IP20
Fire & smoke		NF F 16-101, NF F 16-102, EN 45545-2: HL3 for requirements R22, R23, R26
Insulation materials		Housing polyamide 66, 30% glass

Relay module D4-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
IEC 60529	European standard describes the protection class (IP-code)



Relay module

D4-U200

Options

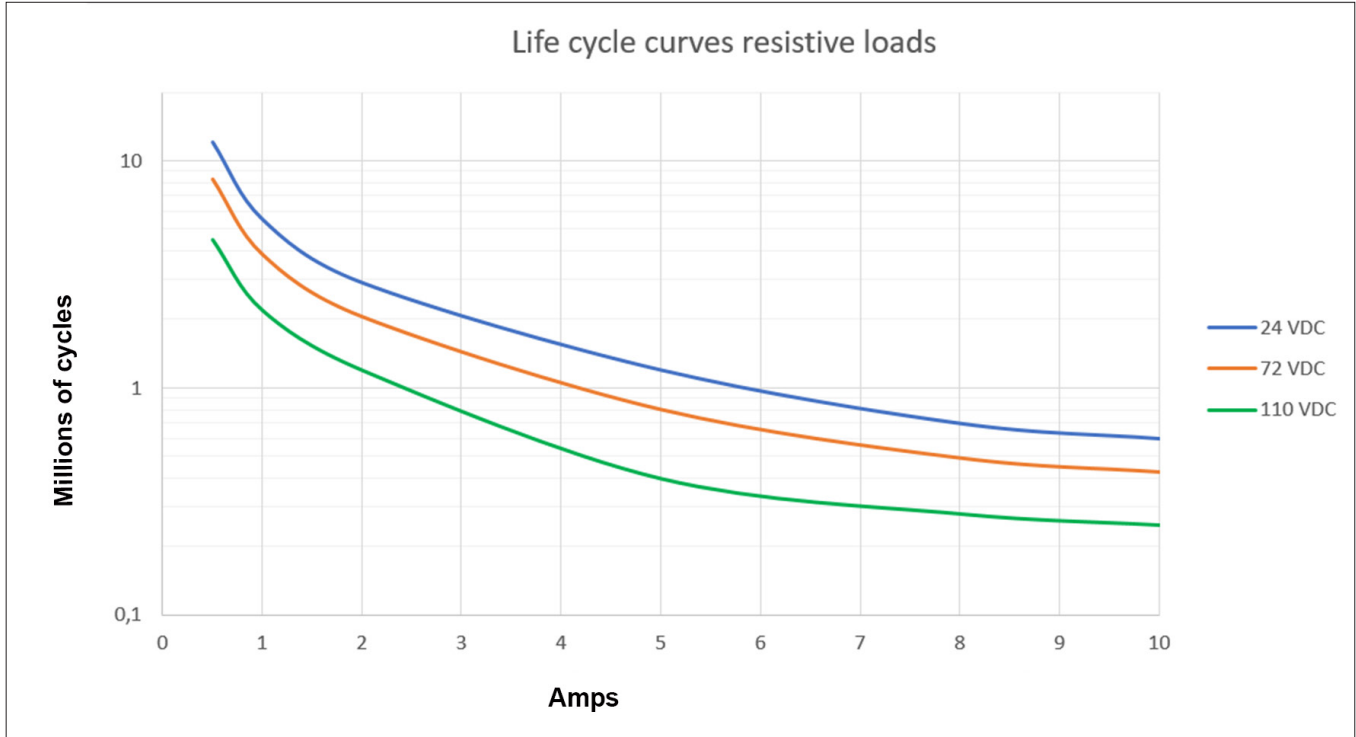
Code	Description	Remark	Cannot be combined with:
Standard options:			
C	Low temperature (-50 °C)	Icontact < 8 A	
E*	Au; Gold plated contacts (10 µm)		M
K	Extra dust protection	IP50 Cat 2	
N	No magnetic arc blow-out		
Q	Double zener diode over coil	Maximum allowed peak voltage 180 V, higher voltage will damage the diode.	
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).

Relay module D4-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.

Instructions for use

Installation

Warning!

- Before installation or working on the relay: always disconnect the power supply first!
- Never use silicon in the proximity of the relay module
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition

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

If the relay doesn't work after inspection, replace the relay module with a similar model. Do not attempt to open the relay module 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

Relay module D4-U200

Ordering scheme

D4-U2		-	-	L
Coil voltages	01			24 VDC
	02			48 VDC
	03			72 VDC
	04			110 VDC
	05			96 VDC
	06			12 VDC
	07			36 VDC
	10			120 VDC
	12			110 VDC
	13			125 VDC
	15			220 VDC
	20			250 VDC
Contact data	004			0 N/C - 4 N/O
	013			1 N/C - 3 N/O
	022			2 N/C - 2 N/O
Options (add as many options as needed)	C			Low temperature - Max contact current 8 A
	E			Gold plated contacts
	K			Extra dust protection, IP50 (relay only)
	N			No magnetic arc blow-out
	Q			Double zener diode
Special options (minimum order quantity: 20)	M			AgSnO ₂ contacts, highly resistant to welding

Cannot be combined with:

Example: D4-U201-022-LNQ

Description: D4-U200 relay module, Unom: 24 VDC, instantaneous contacts 2 N/O - 2 N/C, LED (standard), no magnetic arc blow out, double zener diode

Relay module
D4-U200

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Mors Smitt Asia Ltd.
Unit B & C, 25/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 Ltd.
Graycar Business Park,
Burton on Trent, DE13 8EN, UK
Tel: +44 (0)1283 357 263
sales.msuk@wabtec.com

Wabtec Netherlands B.V.
Vrieslantlaan 6,
3526 AA, Utrecht, Netherlands
Tel: +31 (0)30 288 1311
sales.msbv@wabtec.com

Mors Smitt Technologies Ltd.
1010 Johnson Drive,
Buffalo Grove, IL 60089-6918, USA
Tel: +1 847 777 6497
salesmst@wabtec.com

RMS Mors Smitt
6 Anzed Court,
Mulgrave, VIC 3170, Australia
Tel: +61 (0)3 8544 1200
sales.rms@wabtec.com

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