

Referred schedule drawing for certificates Presale 17ATEX170725, Presale 17ATEX170727, ECEX PRE 17/0307, ECEX PRE 17/0308, N° RU C-DE AB24.B.04261, FM16US055X and FM16AQ049X are:
For MC-3/5 EX and MC-3/6 EX: 02820771B | For MC-3/200 EX and MC-3/300 EX: 02820772B
No factors defined within the referred certificate or drawing shall be modified.

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A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903		
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF			
				Proved				
Rev.	WH	date	BN	GN		Origin	Repl. f.	Repl. by



Project no.		2104903L1B-1	
Scale		Draw.no.	
		2104903L1B-1	
		Sheet 1	
		Next 2	

project: 2104903L1B-1

Order: PO18-2100468

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Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24 E 04261, FM16US055X and FM16CA049X are:
For MC-3-6 EX and MC-3-6 EX: 90280771B | For MC-3200 EX and MC-3300 EX: 90280772B
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				Proved				
Rev.	WH	date	BN	GN		Origin	Repl. f.	Repl. by



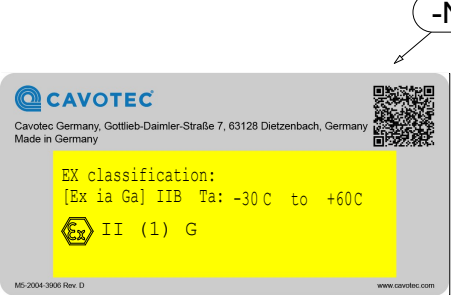
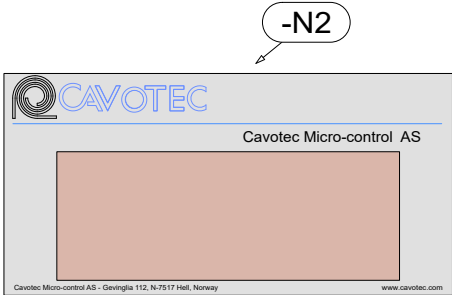
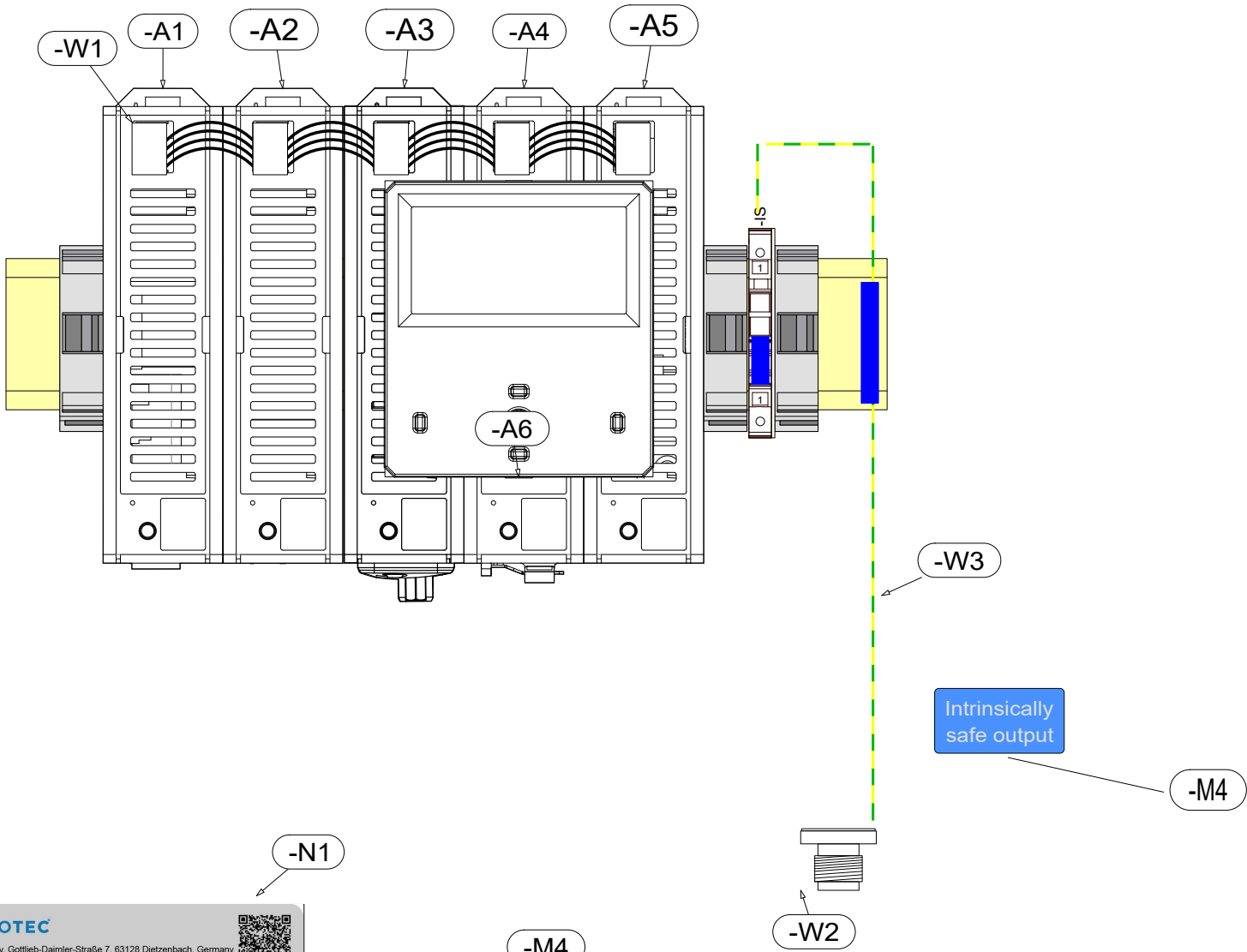
2. General Arrangement
General Arrangement

Project no.		2104903L1B-1		=M33-EX2104903-1	
Scale		1:1		+GA	
Draw.no.		2104903L1B-1		Sheet	2
				Next	3



Refered schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24, E 04261, FM16US065X and FM16CA049X are:
For MC-3-6 EX and MC-3-6 EX: 90280771B | For MC-3200 EX and MC-3300 EX: 90280772B
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-M4
This equipment contains intrinsically safe circuits

Frequency: 419.050 MHz

STD DIN-Rail: 20 cm

A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903 PO18-2100468		3. Base Unit Base Unit	Project no. 2104903L1B-1		=MBL-2104903-01EX-1-1	
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF				Scale 1:1		Draw.no. 2104903L1B-1	
Rev.	WH	date	BN	GN							Sheet 3 Next 4	

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1	2	3	4	5	6	7	8
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FMC Type: Easy Drive

Refered schedule drawing for certificates Presafe 17ATEX10725, Presafe 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N°RU C-DE AB24, E 04261, FM16US0055X and FM16CA0049X are:
For MC-3-6 EX and MC-3-6 EX: 90280771B | For MC-3200 EX and MC-3300 EX: 90280772B
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B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF
				Proved	
Rev.	WH	date	BN	GN	

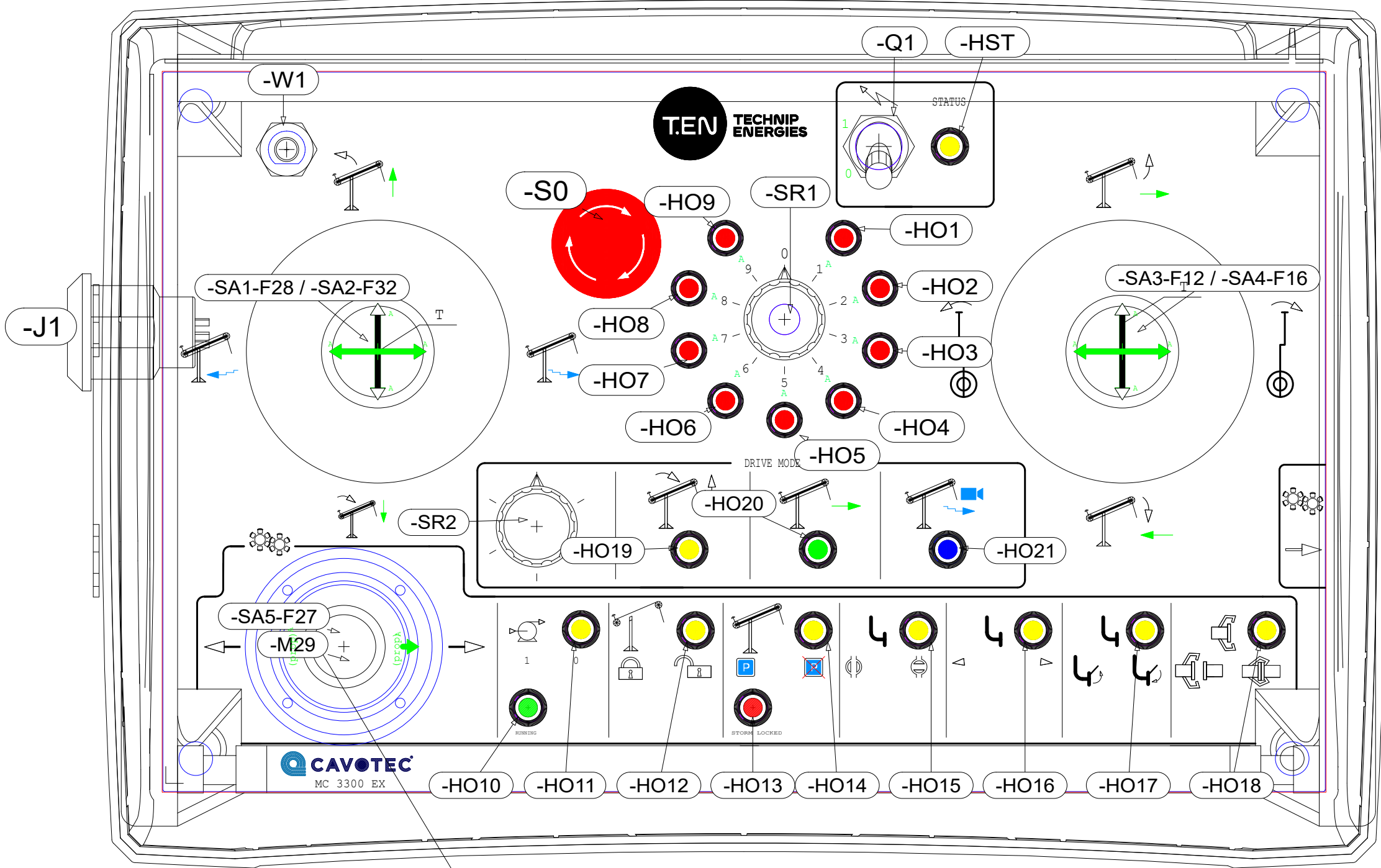
FMC
SO60-2104903
PO18-2100468

Origin Repl. f. Repl. by



4. Terminal Unit
Terminal Unit

Project no.	2104903L1B-1	=M33-2104903-01EX-1-1
Scale	1:1	Draw.no.
		2104903L1B-1
		Sheet 5
		Next 6



TERMINAL UNIT

Cavotec Micro-control AS N-7517 Hell, Norway	
Remote control MC-3300 EX	
Ex ia IIB T4 Gb -20°C ≤Ta≤ +60°C (cable only: -30°C)	
Presafe 17ATEX10727 IECEx PRE 17.0038	Serial no : 1XXXX Prod. date : 201X.XX
II 2 G	0470
-Use only replaceable battery pack MC-EX-BATTERY3 -Battery and cable shall not be used simultaneously	

ROTATE -M29 180 DEGREE SO
DIRECTION 3-4 IS ACTIVE.
JOYSTICK SA5-F27 MUST BE ROTATED
180 DEGREE TO AVOID COLLISION
WITH KB2 CARD

Frequency: 419.050 MHz

BOTTOM OF TERMINAL

Low battery signal = F33
Inactivity timeout: 10min.

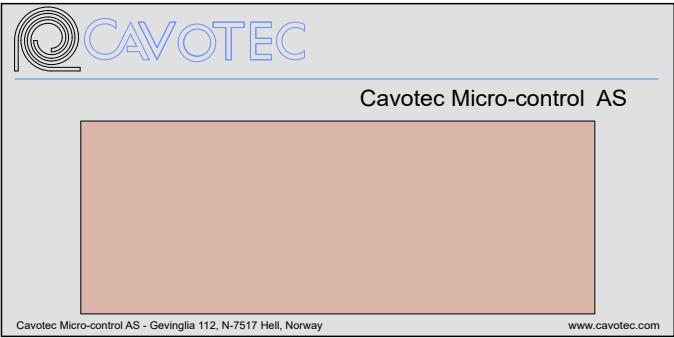
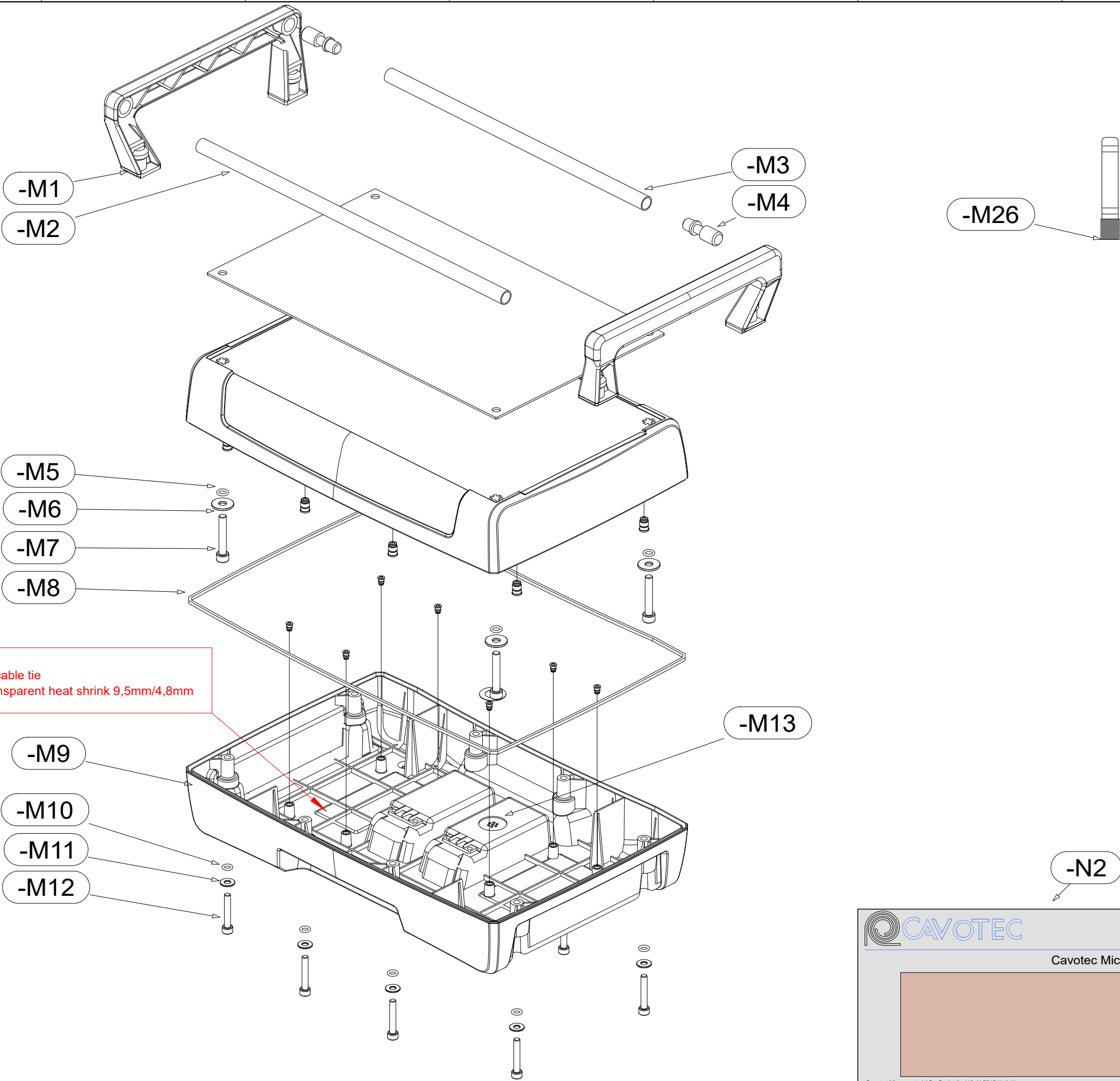
TESTED



Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24, E 04261, FM16US065X and FM16CA049X are:
For MC-3-5 EX and MC-3-6 EX: 902807T1B | For MC-320 EX and MC-3300 EX: 902807T2B
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Internal antenna:
Fixed with self adhesive base + cable tie
SMB connector isolated with transparent heat shrink 9,5mm/4,8mm



A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903 PO18-2100468			4. Terminal Unit Terminal Unit	Project no.		2104903L1B-1		=M33-2104903-01EX-1-1	
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF					Scale		1:1		Draw.no.	
Rev.	WH	date	BN	GN		Origin	Repl. f.	Repl. by				2104903L1B-1		Sheet	6
														Next	7



Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24, E 04261, FM16US0055X and FM16CA0049X are:
For MC-3-6 EX and MC-3-6 EX: 90280771B | For MC-320 EX and MC-3300 EX: 90280772B
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				Proved			
Rev.	WH	date	BN	GN		Origin	Repl. f. Repl. by



4. Terminal Unit
Terminal Unit

Project no.		2104903L1B-1		=M33-2104903-01EX-1-1	
Scale		1:1		Draw.no.	
				2104903L1B-1	
				Sheet	7
				Next	8



Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24, E 04261, FM16US0055X and FM16CA0049X are:
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B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF			
				Proved				
Rev.	WH	date	BN	GN		Origin	Repl. f.	Repl. by



4. Terminal Unit
Terminal Unit

Project no.		2104903L1B-1		=M33-2104903-01EX-1-1	
Scale		1:1		Draw.no.	
				2104903L1B-1	
				Sheet	8
				Next	9



Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N° RU C-DE AB24, E 04261, FM16US055X and FM16CA049X are:
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B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF		
				Proved			
Rev.	WH	date	BN	GN		Origin	Repl. f. Repl. by



4.Terminal Unit
Terminal Unit

Project no.		2104903L1B-1		=M33-2104903-01EX-1-1	
Scale		1:1		Draw.no.	
				2104903L1B-1	
				Sheet	9
				Next	10



Refered schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N°RU C-DE AB24, E 04261, FM16US0065X and FM16CA0049X are:
For MC-3-6 EX and MC-3-6 EX: 90280771B | For MC-3200 EX and MC-3300 EX: 90280772B
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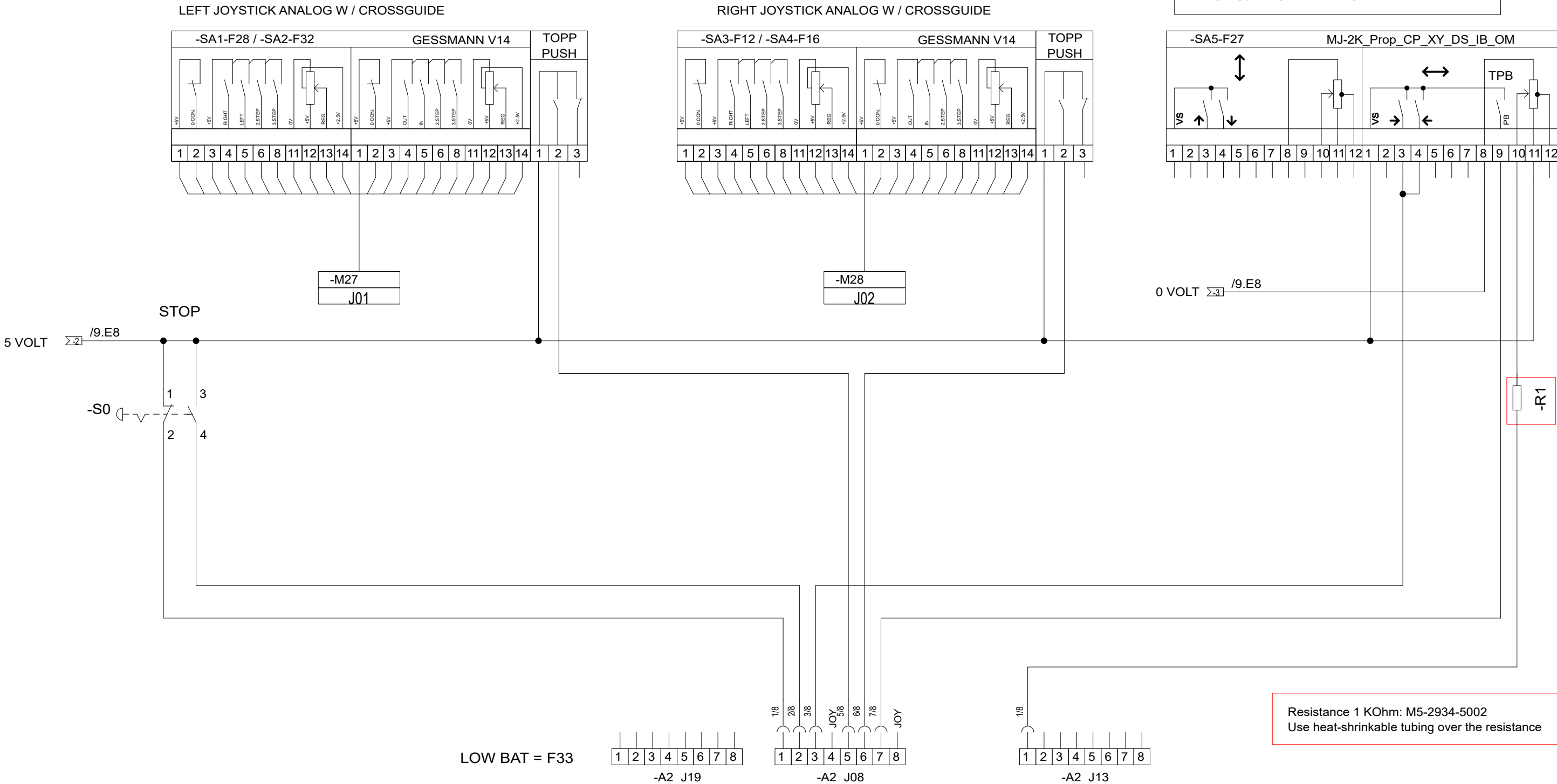
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				Proved			
Rev.	WH	date	BN	GN		Origin	Repl. f.



4.Terminal Unit
Terminal Unit

Project no.		2104903L1B-1		=M33-2104903-01EX-1-1	
Scale		1:1		Draw.no.	
				2104903L1B-1	
				Sheet	10
				Next	11

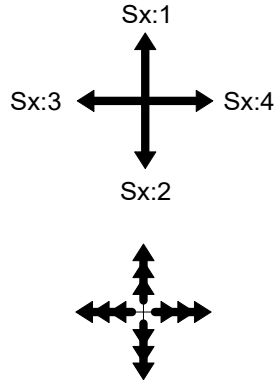




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LAYOUT DESCRIPTION



PROPORTIONAL JOYSTICK

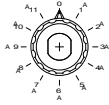
Sx = JOYSTICK REFERENCE NUMBER
:1 = JOYSTICK MOVED FORWARD
:2 = JOYSTICK MOVED BACKWARDS
:3 = JOYSTICK MOVED LEFT
:4 = JOYSTICK MOVED RIGHT

DIGITAL JOYSTICK

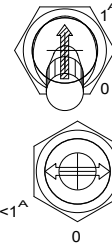
Sx:y:1 = FIRST STEP IN y DIRECTION
Sx:y:2 = SECOND STEP IN y DIRECTION
Sx:y:3 = THIRD STEP IN y DIRECTION
EXAMPLE: S1 JOYSTICK MOVED
TWO STEPS TO THE RIGHT S1:4:2

SWITCHES

0 = NO SIGNAL IN THIS POSITION (SWITCH OFF)
1 = SIGNAL IN THIS POSITION (SWITCH ON)
(1) = SWITCH IS SPRING RETURN FROM THIS POSITION
(1)T = SWITCH IS SPRING RETURN AND SIGNAL IS TOGGLED
1 = SWITCH IS MAINTAINED IN THIS POSITION
<1 OR 1L = SWITCH IS MEC.LOCKED IN THIS POSITION



ROTARY SWITCHES
Sx:y = SWITCH Sx, STEP y IS COUNTED
CW FROM TOP POSITION



EXAMPLE: 2 POSITION SWITCH MOUNTED IN
1/2 DIRECTION, MAINTAINED IN BOTH POS.
SWITCH GIVES SIGNAL WHEN MOVED FORWARD

EXAMPLE: 3 POSITION SWITCH MOUNTED IN
3/4 DIRECTION MEC. LOCKED IN LEFT POSITION,
(1)^ SPRING RETURN IN RIGHT DIRECTION

Part name function relation:
(Special: See extra marking on drawings)

General:

Channels separated with a / are at one switch in the same direction,
channels separated with a - are at one switch but in another direction.

F=Digital channel

A=Analogue channel, (prop+)=128....255 / (prop-)=128....0

O=Digital output channel

MIN=Digital input MIN programming (SMIN)

MAX=Digital input MAX programming (SMAX)

MICRO=Digital input MICRO speed (SMICRO)

Switch change frequency: SCF

Status LED: HST

LED: H0#, e.g. H04=O4

Switch: SF#, F#=Digital channel, e.g. SF10=F10, or SF#/F# if more channels are related, e.g. SF1/F8=F1 and F8

Switch with LED: SF#/O#, F#=Digital channel, O#=LED channel, e.g. SF10/O20=F10 for the switch, O20 for the LED,
or SF#/F#/O#/O# if more channels are related, e.g. SF1/F8/O2/O9=F1 and F8, O2 and O9

Rotary switch: SR#, no relation to function, function numbers are written in the layout or in function table

Toggle switch: SF#, F#=Digital channel direction 1 or 3, e.g. SF6=F6 direction 1 or 3

Toggle switch: S-F#, F#=Digital channel direction 2 or 4, e.g. S-F6=F6 direction 2 or 4

Toggle switch: SF#-F#, 1st F#=Digital channel direction 1, 2nd F#=Digital channel direction 2,
e.g. SF7-F8=F7 direction 1, F8 direction 2

Toggle switch: SF#-F#, 1st F#=Digital channel direction 3, 2nd F#=Digital channel direction 4,
e.g. SF3-F4=F3 direction 3, F4 direction 4

Digital joystick: MS#, no relation to function, function numbers are written in the layout,
e.g. F3/F2/F1 / F4/F2/F3 = F1=left direction, F2=2nd step, F3=3rd step / F4=right direction, F2=2nd step, F3=rd step

Potentiometer: SA#, A#=Analogue channel

Cross joystick proportional: SA#/F#-A#/F#,

1st A#=Analogue channel direction 1/2, 1st F#=Digital channel direction 1/2,

2nd A#=Analogue channel direction 3/4, 2nd F#=Digital channel direction 3/4,

e.g. SA2/F12-A4/F14=A2/F12 direction 1/2, A4/F14 direct

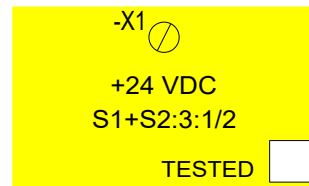
Linear joystick proportional: SA#/F#, A#=Analogue channel, F#=Digital channel, e.g. SA1/F11=A1/F11

GENERAL LOGIC AND EXAMPLES

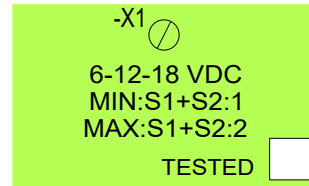
A+B = AND, BOTH ARGUMENT A AND B MUST BE TRUE
A+ NOT B = NOT, ARGUMENT A MUST BE TRUE AND ARGUMENT B MUST BE FALSE
A/B = OR, EITHER A OR B MUST BE TRUE
+24 VDC = SIGNAL OUT WHEN ARGUMENT TRUE WILL BE 24 VDC
6-12-18 VDC = PROPORTIONAL SIGNAL OUT WILL BE 6-12-18 VDC
MIN&MAX ARGUMENTS SHOWN BELOW
195-705mA = PROPORTIONAL SIGNAL OUT WILL FROM 195 TO 705 mA
MIN&MAX ARGUMENTS SHOWN BELOW
MIN = PROPTIONAL SIGNAL WILL BE MINIMUM VALUE IN THIS DIRECTION
MAX = PROPTIONAL SIGNAL WILL BE MAXIMUM VALUE IN THIS DIRECTION
* = MORE COMPLEX LOGIC DESCRIBED OTHER PAGE

E-STOP

UNLESS OTHER IS SPECIFIED EMERGENCY RELAYS ARE
ALWAYS CLOSED DURING NORMAL OPERATION.
ANY ERROR SUCH AS LOSS OF RADIO LINK, POWER OFF,
HW OR SW ERROR WILL CAUSE RELAY TO OPEN
AND ALL OTHER FUNCTIONS WILL BE DISABLED,
TO RESUME NORMAL OPERATION
PULL OUT E-STOP, TURN TERMINAL OFF/ON AND PUSH STARTBUTTON



TERMINAL WILL GIVE +24 VDC OUT WHEN
SWITCH S1 IS ON (PUSHED FORWARD) AND
S2 IS MOVED LEFT, IN FIRST OR SECOND STEP.



TERMINAL WILL GIVE REGULATED SIGNAL 6-18 VDC
12 VDC IS CENTER. MAX OUT WILL BE WHEN
YOU HAVE TURNED S1 ON, AND MOVED JOYSTICK
ALL THE WAY IN 2 DIRECTION (BACKWARDS)

A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903 PO18-2100468			5. Logic Logic	Project no. 2104903L1B-1		Sheet 11 Next 12	
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF								
Rev.	change	date	name	Standard		Origin	Repl. f.	Repl. by		Scale 1:1	Draw.no. 2104903L1B-1		



Referred schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, N°RU C-DE AB24, E 04261, FM16US0055X and FM16CA0049X are:
For MC-3-6 EX and MC-3-6 EX-9028077TB | For MC-3200 EX and MC-3300 EX: 90280772B
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bill of material

* Certificates are located on USB flash drive

Higher Level Assignment:				Location designation:			
Pos.	Location	Device Designation	Article Number	Description	No.	Ex Code	Ex Certificate
1	+GA	-A1	M5-1112-5236	Gain Flex Antenna	1		
2	+GA	-G1, -G2	M9-1051-3600	EX Battery MC-3-Series	2		
3	+GA	-J4	M5-2325-1905	Plug TNC for RG 213	1		
4	+GA	-M1	M9-1510-3300	Support strap MC-3300 EX	1		
5	+GA	-M5	M5-1119-4120	Antenna Bracket Plastic	1		
6	+GA	-M6	M9-3001-0002	Instruction Manual EX MC-3 series	1		
7	+GA	-M7	M5-3001-0002	Instruction Manual MC-3 Series	1		
8	+GA	-M8	M5-1110-1905	Antenna Cable RG213 TNC-TNC 5m	1		
9	+GA	-M8	M5-2325-5030	TNC female/female	1		
10	+GA	-RX1	MBL-<order no>-01EX	Base unit MC-MB2 EX acc. to order no.	1		
11	+GA	-TX1	M33-<order no>-01EX	MC-3300 EX Terminal No.1	1	See Certificate COC-076 ATEX, COC-074 IECEx	See Certificate COC-076 ATEX, COC-074 IECEx
12	+GA	-U1	M5-1080-3623	Charger MC-3series 10-30VDC 100-240VAC EU1UK US AU			
13	+GA	-USB1	M5-3001-0010	Documentation package on flash drive	1		
14	+RX	-A1	M5-1036-2001	MC-MB2-PWR	1		
15	+RX	-A1, -A2, -A3, -A4	M5-2052-0222	Module clip MB2 Material PC	4		
16	+RX	-A1, -A5	M5-2330-0012	Jumper for 3B-bus end termination	2		
17	+RX	-A2	M5-1036-2003	MC-MB2-SFR	1		
18	+RX	-A3	M5-1036-2266	MC-MB2-CC Profinet	1		
19	+RX	-A4	M5-1036-2002	MC-MB2-PM	1		
20	+RX	-A5	M9-1036-2244	MC-MB2-TCM EX w/Radio (418.725-419.425 MHz)		See certificate for MC-EX-RX-CD-TRX	See certificate for MC-EX-RX-CD-TRX
21	+RX	-A6	M5-1036-2020	MC-MB2-LCD	1		
22	+RX	-IS	M5-2413-4712	Terminal Springclip, 1 level 2 connection Blue	1	Ex II 2 G Eex e II / Ex e II	PTB98ATEX 3129U / IECEx PTB 03.0004U
23	+RX	-M2, -M3, -M7	M5-2490-8202	End stop bracket 10mm use with M5-2413-4xxx	3		
24	+RX	-M4	M9-2005-0114	Label, Intrinsically safe Output	1		
25	+RX	-M4	M9-2005-0003	Label, Intrinsically safe Only English text	1		
26	+RX	-N1	M5-2004-3906	Label product general Germany	1		



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				Proved	
Rev.	WH	date	BN	GN	

* Certificates are located on USB flash drive

Higher Level Assignment:				Location designation:			
Pos.	Location	Device Designation	Article Number	Description	No.	Ex Code	Ex Certificate
27	+RX	-N2	M5-2004-3900	Label product general Norway	1		
28	+RX	-N2	M5-3000-4501	Document bag A5 transparent	1		
29	+RX	-W1	M5-2823-1205	MB2 3B-Bus Cable 5 connectors	1		
30	+RX	-W2	M5-2325-5302	Connector 16_SMC-50-2-11/111_N	1		
31	+RX	-W2	M5-1111-0003	90cm Internal antenna cable RG-316 SMC-TNC	1		
32	+RX	-W3	M5-1119-0020	Antenna Ground Cable	1		
33	+RX	-X2	M5-2490-7512	Partition plate 1 level Grey to M5-2413-4xxx	1		
34	+TX	-A1	M9-1020-4300	MC-EX-PM	1		
35	+TX	-A2	M9-1031-3002	MC-KB-2 EX	1		
36	+TX	-A3	M9-1012-7035	MC-EX-CD-PLL-419 [418.725-419.425 MHz]	1	See Certificate for Device -TX1*	See Certificate for Device -TX1*
37	+TX	-HO1, -HO2, -HO3, -HO4, -HO5, -HO6, -HO7, -HO8, -HO9, -HO13	M5-2935-6001	LED Chassis Red APEM	10		
38	+TX	-HO10, -HO20	M5-2935-6002	LED Chassis Green APEM	2		
39	+TX	-HO11, -HO12, -HO14, -HO15, -HO16, -HO17, -HO18, -HO19, -HST	M5-2935-6003	LED Chassis Yellow APEM	9		
40	+TX	-HO21	M5-2935-6005	LED Chassis Blue APEM	1		
41	+TX	-J8	M5-2823-4003	Cable for MC-KB2/3 2-pole	1		
42	+TX	-J12, -J13, -J21	M5-2823-4002	Cable for MC-KB2 8-pole Grey	3		
43	+TX	-J15, -J16, -J18, -J20, -J24	M5-2823-4001	Cable for MC-KB2 8-pole Black	5		
44	+TX	-J22	M5-2320-1815	Connector molex 2-pole Male	1		
45	+TX	-J22, -J22, -J23,	M5-2329-1856	Crimp terminal Molex Male for 2-pole	4		

A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903 PO18-2100468			 CAVOTEC We connect the future.	6. Bill Of Material Bill Of Material	Project no. 2104903L1B-1					
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF						Scale		Draw.no. 2104903L1B-1		Sheet 13	
				Proved											Next 14	
Rev.	WH		date	BN	GN		Origin	Repl. f.	Repl. by							



Refered schedule drawing for certificates Presale 17ATEX10725, Presale 17ATEX10727, IECEx PRE 17.0037, IECEx PRE 17.0038, № RU C-DE AB24, E 04261, FM16US0055X and FM16CA0049X are:
For MC-3-6 EX and MC-3-6 EX-902807TB | For MC-3200 EX and MC-3300 EX: 9028072B
No factors defined within the referred certificate or drawing shall be modified.

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bill of material

* Certificates are located on USB flash drive

Higher Level Assignment:				Location designation:			
Pos.	Location	Device Designation	Article Number	Description	No.	Ex Code	Ex Certificate
		-J23					
46	+TX	-J23	M5-2320-1814	Plug Molex 2-pole F.male	1		
47	+TX	-M1(2)	M5-2003-3103	Handle MC-3000+/3300	2		
48	+TX	-M2	M5-2020-3301	ROD FOR MC-3300, LONG	1		
49	+TX	-M3	M5-2020-3302	ROD FOR MC-3300, SHORT	1		
50	+TX	-M4(2)	M5-2020-3007	Suspension bit	2		
51	+TX	-M5(4)	M5-2009-0607	O-ring for MC-3300 Handle	4		
52	+TX	-M6(4)	M5-2025-0003	WASHER 6.4 DIN 9021 ACID PROOF	4		
53	+TX	-M7(4)	M5-2023-3635	Screw Hex DIN 912 M6x35 A4	4		
54	+TX	-M8	M5-2009-0306	Neoprene Gasket for MC-3-Series	1		
55	+TX	-M9	M9-1003-3303	Terminal btm for MC-3300 EX	1		
56	+TX	-M10(8)	M5-2009-0528	O-ring for MC-3300 Main	8		
57	+TX	-M11(8)	M5-2025-5121	WASHER 6.4 DIN 9021 ACID PROOF	8		
58	+TX	-M12(8)	M5-2023-3530	Screw Hex DIN 912 M5x30 A4	8		
59	+TX	-M26	M9-1112-3001	Antenna RPSMA	1		
60	+TX	-M27, -M28	M9-2823-1400	V14 EX Analog Cable	2		
61	+TX	-M29	M5-2290-5504	Gate single MJ-2K 4/0	1		
62	+TX	-N1	M9-2004-0000	Label Product General EX	1		
63	+TX	-N2	M5-2004-3900	Label product general Norway	1		
64	+TX	-Q1	M5-2129-3002	Sealing Boot For Toggle Switch	1		
65	+TX	-Q1	M5-2152-1217	Switch Toggle 0-1	1		
66	+TX	-R1	M5-2934-5002	Resistor 1K 0.6W	1		
67	+TX	-S0	M5-2140-0225	E-stop (NC)+(NO) Red	1		
68	+TX		M5-2217-1402	CG L/L L/L /1xPB=BLACK	2		
		-SA1-F28 / -SA2-F32	-SA3-F12 / -SA4-F16				



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A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF
				Proved	
Rev.	WH	date	BN	GN	

* Certificates are located on USB flash drive

[illegible]

A	ISSUED FOR CUSTOMER	30.09.2021	EF	date	13.09.2021	FMC SO60-2104903 PO18-2100468			 CAVOTEC We connect the future.	6. Bill Of Material Bill Of Material	Project no. 2104903L1B-1					
B	REMOVED BUE1 AND IRQ S0	06.01.2022	EF	name	EF						Scale		Draw.no. 2104903L1B-1		Sheet 15	
				Proved											Next 16	
Rev.	WH	date	BN	GN		Origin	Repl. f.	Repl. by								



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Higher Level Assignment: _____ Location designation: _____

* Unit contains custom software
or requires configuration



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7. Rec Spare

Recommended Spare Parts