

**Metor 300 EMD**  
**MAINTENANCE MANUAL**  
**9100633 REV. 02**

***Rapiscan***<sup>®</sup>  
***s y s t e m s***

An OSI Systems Company

# TABLE OF CONTENTS

Author Tapio Virtanen	Rev. 02	Code 9100633
Approved	Date 15.01.2009	Document
Product Metor 300 EMD	Archives	
Title <b>MAINTENANCE MANUAL</b>		

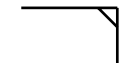
		CODE	REV.
1	TABLE OF CONTENTS		
2	Metor 300 EMD		
	- Product structure	9100551	06
	- Part list	8100882	04
	- Operational description	9100632	1.10
	- Block diagram	9100631	01
	- Wiring diagram	9100574	06
3	MCES 5173 Cross Piece and Electronics Set		
	- Part list	8100884	05
	- Part list MCSS 5176	8100887	04
	- Part list MCSS 5176.1	8100962	04
	- Part list MCSS 5176.2	8100963	04
	- Assembly drawing	9100601	003
	- RX&TX coil cable	8101244	03
	- RX-MSDU cable	8101245	03
	- TX coil cable (old)	9100556	03
	- RX coil cable (old)	9100547	03
	- RX-MSDU cable (old)	9100557	03
4	MELS 5172 Electronics Set		
	- Part list	8100883	05
	- Assembly drawing	9100627	010
	- Operational description	9100636	1.10
	- AC cable	9100318	A
	- DC power cable	9100584	02
	- Operational description MCCU 5174	9100641	1.10
	- Block diagram MCCU 5174	9100638	01
	- Operational description MSDU 5175	9100645	1.00
	- Block diagram MSDU 5175	9100643	01

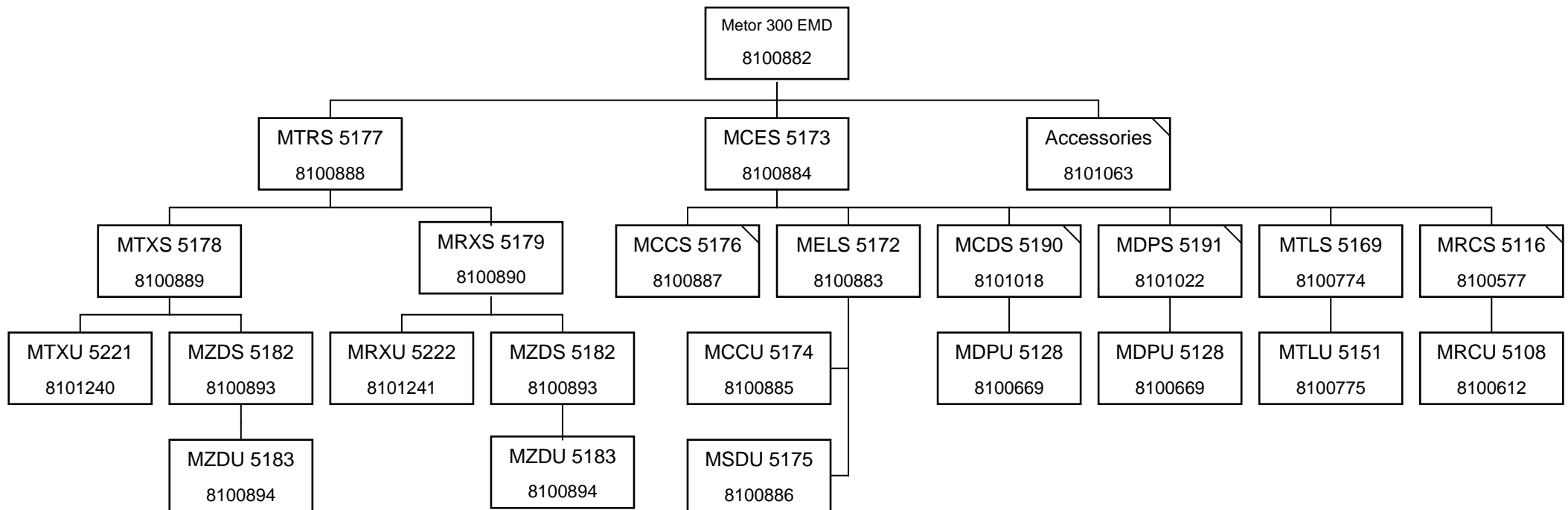
5	MCDS 5190 Control and Display Set		
	- Part list	8101018	01
	- Assembly drawing	9100483	02
	- Operational description	9100525	1.10
	- Display cable	9100585	04
6	MDPS 5191 Display Set		
	- Part list	8101022	01
	- Assembly drawing	9100528	01
7	MTLS 5169 Traffic Light Set		
	- Part list	8100774	01
	- Assembly drawing	9100648	003
8	MRCS 5116 Remote Control Set		
	- Part list	8100577	06
	- Assembly Drawing	9100366	04
	- Operational Description	9100412	1.10
9	MTRS 5177 TX/RX Coil Panel Set		
	- Part list	8100888	01
10	MTXS 5178 Transmitter Panel Set		
	- Part list	8100889	06
	- Assembly drawing	9100602	006
	- Operational description MTXU 5180, 5221	9100649	1.01
	- Block diagram MTXU 5180, 5221	9100646	01
	- Part list MZDS 5182	8100893	01
	- Zone Display Installation	9100510	01
	- Zone Display Cable	9100512	02
	- Part list Traffic Counter Set	8100755	01
	- Assembly drawing Traffic Counter Set	9100520	01
11	MRXS 5179 Receiver Panel Set		
	- Part list	8100890	07
	- Assembly drawing	9100603	005
	- Operational description MRXU 5181, 5222	9100653	1.01
	- Block diagram MRXU 5181, 5222	9100650	01

12	Accessories and Spare Parts		
	- Part list, Accessories	8101063	03
	- Part list, On-site kit	8101029	03
	- Part list, Maintenance kit	8101030	02
13	Error Messages and Troubleshooting		
	- Error Messages	9100634	1.00
14	Revision History		

**Metor 300 EMD**

Author T. Virtanen	Rev. 06	Code 9100551
Approved	Date 12.01.2009	Document
Product Metor 300 EMD		Archives
Title <b>PRODUCT STRUCTURE Metor 300 EMD</b>		

  
Depends on customer



## SINGLE LEVEL

Last.revision: 04

Revision updated: 31.10.2007

Version: PLANNING

Accept:

8100882 40E Metor 300 EMD

1,000 KPL

04

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100884 40E	MCES 5173 M300 EMD CROSS PIECE AND ELECTRONICS SET	1,000	KPL		04
1	20	8100888 40E	MTRS 5177 M300 EMD TX/RX COIL PANEL SET	1,000	KPL		01
1	200	8101063 40E	ACCESSORIES M300 EMD	1,000	KPL		02

## Related Drawings

9000	9100551 3QE	PRODUCT STRUCTURE METOR 300 EMD	0,000	KPL		05
9001	9100765 4QE	ORDER AND SHIPPING STRUCTURE M300 EMD	0,000	KPL		1.10
9002	9100631 3LE	BLOCK DIAGRAM M300 EMD	0,000	KPL		01
9003	9100574 1JE	WIRING DIAGRAM METOR 300 EMD	0,000	KPL		05
9004	9100632 4VE	OPERATIONAL DESCRIPTION METOR 300 EMD	0,000	KPL		1.10
9006	9100634 4VE	FAULT TRACING AND ERROR MESSAGES METOR 300 EMD	0,000	KPL		1.00
9007	9100635 4VE	SOFTWARE UPDATE GUIDE METOR 300 EMD	0,000	KPL		1.10
9008	9100626 4XE	TESTING PLAN MCSS/MTRS DETECTION COIL SYSTEM M300 EMD	0,000	KPL		1.00
9009	9100715 4XE	TESTING PLAN ELECTRONICS MELS 5172,MCDS 5190/MDPS 5191, MRCS 5116 M300	0,000	KPL		1.00



Author J Niemi	Rev. 1.10	Code 9100 632-4VE
Approved ORA	Date 12.9.2007	Document
Product Metor 300 EMD		Archives Metor 300 EMD
Title <b>OPERATIONAL DESCRIPTION</b>		

## METAL DETECTOR GATE, METOR 300 EMD

### 1 GENERAL

Metor 300 EMD metal detector is designed to give an alarm when a metal object larger than allowed by calibration is taken through the gate. Due to multiple vertical zones the detector discriminates weapons from several small innocuous objects and indicates the height where the weapon is taken through the gate.

The Metor 300 EMD metal detector gate consists of the following main modules:

- Crosspiece, MCCA 5176
- Receiver coil panel, MRXS 5179
- Transmitter coil panel, MTXS 5178
- Electronics set, MELS 5172
- Display set, MDPS 5142 or MCDS 5190 (with keyboard)
- Remote control unit, MRCS 5116

In the following is a description how to service the M300 main modules. Separate documents describe more in-depth description of the functions of these modules.

### 2 TECHNICAL DATA

#### 2.1 Power Supply

Mains voltage, nominal:	100 – 240VAC
Mains voltage, max:	90 – 264VAC
Mains frequency:	50 / 60Hz
Battery voltage (optional):	12VDC
Mains fuses:	2xT2AL250V, slow blow, 5x20mm

**CAUTION:**  
**DOUBLE POLE / NEUTRAL FUSING**

#### 2.2 Operating Conditions

Ambient temperature:	-10...55°C
Storage temperature:	-20...55°C
Humidity:	0 – 95%, no condensation
Protection class:	IP21

## 2.3 Power Consumption

This is the power consumption of the complete metal detector including the Display Unit, two Zone Displays and Traffic Lights.

State	DC +12V	AC (line)
Standby (transmitters off)	12W	32W
Normal (transmitters on, no alarm)	38W	57W
Startup (all lights on)	53W	70W

## 3 CROSSPIECE

The crosspiece consists of:

- Frame, made of extruded aluminum profile
- Lid
- Cover for the cables (on top)

The crosspiece is symmetrical and can be installed either way.

## 4 ELECTRONICS

The MELS is the main electronics unit in M300 EMD. It includes two printed circuit boards and the AC/DC power supply.

### 4.1 Replacing the MELS

- Disconnect all cables from the MELS
- Loosen, do not remove, the two screws at the power supply end
- Support the MELS and remove the other two screws at the opposite end
- Withdraw the MELS from the crosspiece

## 5 DISPLAY UNIT

The Display Unit has an alphanumeric display for user interface, Red (alarm), yellow (wait) and green (ready) lamps, buzzer for alarm sound and (optional) keyboard.

The Display Unit can be mounted on either side of the crosspiece or on either coil panel. The Display Unit can be secured to crosspiece by two M4 screws.

If the MDPS is replaced the MRCU serial number must be taught to the new MDPS. See **INSTALLATION AND OPERATING MANUAL** for the correct procedure.

## 6 COIL PANELS

The Receiver coil panel and Transmitter coil panel are externally identical except that the transmitter side has two photocells and the receiver side has two reflectors on the inside. Up to two Zone Displays can be mounted to M300 EMD in any combination to either panel.

## 6.1 Replacing the Zone Display

To Replace the Zone Display follow the procedure described in the INSTALLATION AND OPERATING MANUAL.

## 6.2 Replacing the MTXU or MRXU

- Remove the top cover of the coil panel
- Disconnect the coil cable from inside the crosspiece
- Disconnect the Zone Display cable(s)
- Remove the two panhead screws from inside the crosspiece holding the PCB in place
- Remove the panhead screw between the Zone Display connectors (on top)
- Withdraw the unit gently so that You can see the connector(s) at the lower end of the unit through the opening in the coil panel
- Disconnect the cable(s) coming from inside the coil panel and secure them so that they will not fall inside the coil panel
- Withdraw the unit
- Installation is reverse to removing

## 6.3 Testing Coils

In the following is listed the nominal coil resistances of the RX- and TX - coils. When measuring the resistance disconnect the cable from the PCB.

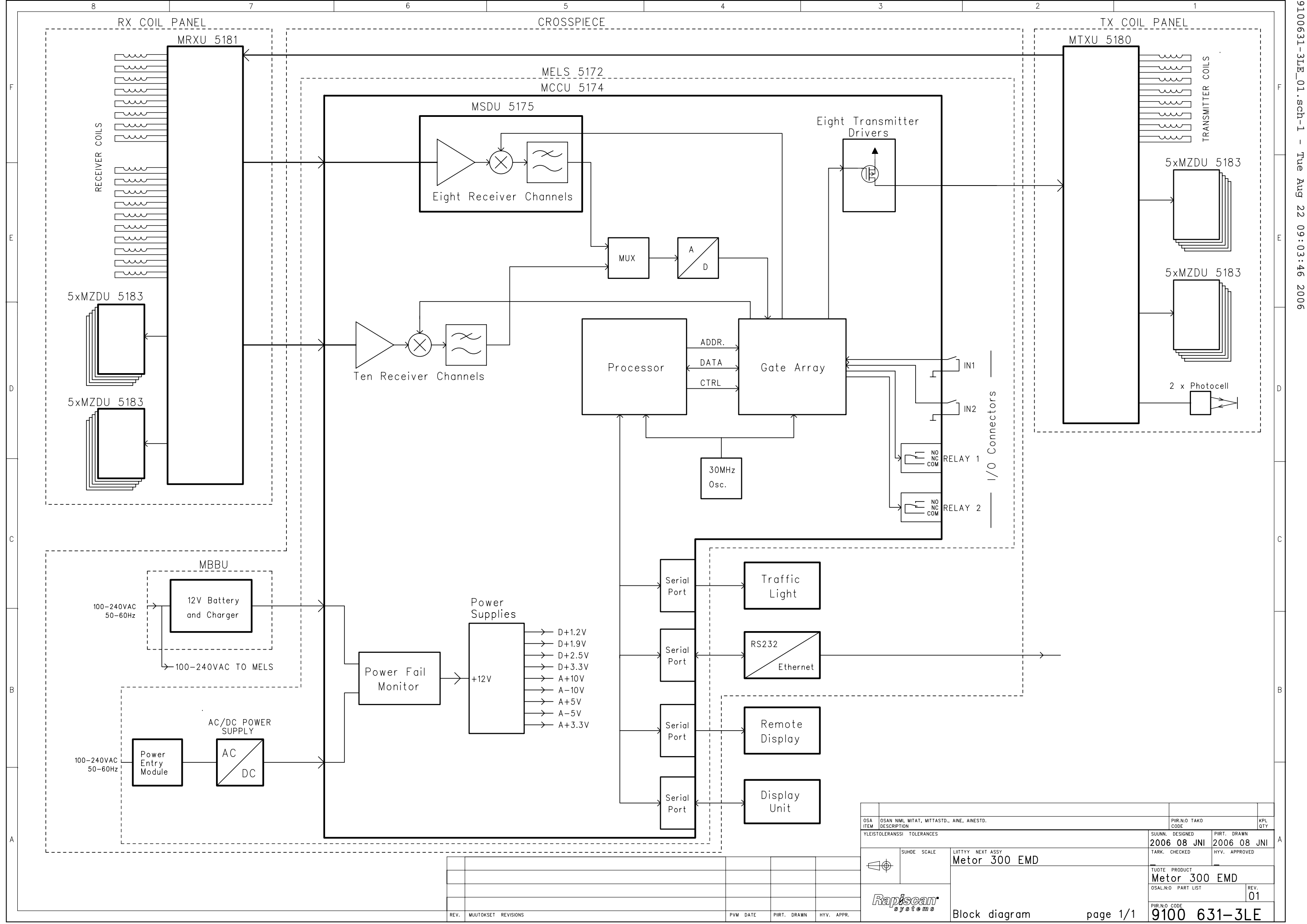
<b>TX</b>					
X5 Pins	1-2	3-4	5-6	7-8	9-10
R(ohm)	11	4	10	10	10
<b>TX</b>					
X6 Pins	1-2	3-4	5-6		
R(ohm)	5	5	5		

<b>RX</b>					
X5 Pins	1-2	3-4	5-6	7-8	9-10
R(ohm)	5	3	10	10	10
<b>RX</b>					
X6 Pins	1-2	3-4	5-6		
R(ohm)	5	7	3		
<b>RX</b>					
X7 Pins	1-2	3-4	5-6	7-8	9-10
R(ohm)	3	3	3	3	3
<b>RX</b>					
X8 Pins	1-2	3-4	5-6	7-8	9-10
R(ohm)	-	3	3	3	3

## **7 REMOTE CONTROL UNIT**

The Remote Control unit MRCS is normally stored inside the crosspiece. The MRCS communicates with the Display Unit via bi-directional infrared link.

If the MRCS is replaced the new MRCS serial number must be taught to the MDPS. See Installation and Operating Manual for the correct procedure.



OSA ITEM	OSAN NIMI, MITAT, MITASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
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		2006 08 JUNI	2006 08 JUNI
		TARK. CHECKED	HYV. APPROVED
SUHDE SCALE		LIITTY NEXT ASSY	
		Metor 300 EMD	
TUOTE PRODUCT		Metor 300 EMD	
OSAL.N:O PART LIST		REV. 01	
PIIR.N:O CODE		9100 631-3LE	

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

1100631-3LE\_01.sch-1 - Tue Aug 22 09:03:46 2006



**MCES 5173 Cross Piece and Electronics Set**

## SINGLE LEVEL

Last.revision: 05

Revision updated: 28.10.2008

Version: PLANNING

Accept:

8100884 MCES 5173 M300 EMD CROSS PIECE AND ELECTRONICS SET 1,000 KPL

L. Line	Item	Dty	Description	Qty	U/M	Feat.
1	10	8100887	4OE MCSS 5176 M300 EMD CROSS PIECE SET	1,000	KPL	F1
1	11	8100962	4OE MCSS 5176.1 28"/710mm M300 EMD CROSS PIECE SET	1,000	KPL	F1
1	12	8100963	4OE MCSS 5176.2 32"/813mm M300 EMD CROSS PIECE SET	1,000	KPL	F1
1	20	8100774	4OE MTL5 5169 M300 P, EMD TRAFFIC LIGHT SET	1,000	KPL	
1	30	8100883	4OE MELS 5172 ELECTRONICS SET M300 EMD	1,000	KPL	
1	40	8101022	4OE MDPS 5191 M300 EMD DISPLAY SET	1,000	KPL	O1
1	50	8100577	4OE MRCS 5116 M300 REMOTE CONTROL SET	1,000	KPL	O1
1	60	8101018	4OE MCDS 5190 M300 EMD CONTROL AND DISPLAY SET	1,000	KPL	O1
1	70	8101244	RX & TX Coil Cable M300 EMD	2,000	KPL	
1	80	8101245	RX - MSDU Cable M300 EMD	1,000	KPL	
1	90	2459857	MAINS CABLE 230V 2,5M EUROP. SHUKO 27904	1,000	KPL	F2
1	100	3058291	POWER CORD 115V USA 15FT/4.6M L.GREY 3x18 AVG	1,000	KPL	F2
1	110	3058290	MAINS CABLE 230V 5,0M	1,000	KPL	F2
1	120	3061066	POWER CORD UK GREY STRAIGHT 2M 355565 VOLEX BS1363/A 10A/250V FUSE 13A or FARNEL 285-626 / 355565 VOLEX or RS 425-418	1,000	KPL	F2
1	130	3061722	ETHERNET CABLE CAT-5 RJ45 1.0m STP RED or ELFA 25-509-86 or FARNELL 300-7250	1,000	KPL	
1	140	9100605	4VE INSTALLATION AND OPERATING MANUAL M300 EMD	1,000	KPL	F3
1	141	9100605	4VF INSTALLATION AND OPERATING MANUAL M300 EMD	1,000	KPL	F3
1	150	8101021	2PE QUICK INSTRUCTION LABEL M300 EMD 350x140	1,000	KPL	

## Related Drawings

9000 9100629 4QE DOCUMENT LIST MCES/MTRS M300 EMD 0,000 KPL



## SINGLE LEVEL

Last.revision: 04

Revision updated: 29.09.2008

Version: PLANNING

Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100887	4OE	MCSS 5176 M300 EMD CROSS PIECE SET	1,000	KPL		04
1	10	8100895	2ME CROSS PIECE PROFILE M300 EMD *1	1,000	kpl		009
1	20	8100946	3PE CROSS PIECE FRONT PLATE M300 EMD *2	1,000	kpl		005
1	30	8100951	3PE TRAFFIC LIGHT FRONT METOR 300 EMD *3	1,000	KPL		005
1	40	8100903	3ME FASTENING BAR M300 EMD *4	2,000	kpl		004
1	50	8100398	4ME CONNECTOR COVER M300 *5	1,000	KPL		001
1	60	8100898	3ME CROSS PIECE FLANGE M300 EMD *6	2,000	kpl		006
1	70	8100952	4ME SCREW ADAPTER M300 EMD *7	8,000	KPL		003
1	80	8100960	4OE CROSS PIECE HATCH M300 EMD *8	1,000	KPL		02
1	90	8100055	4PE TYPE STICKER 20x40 MELS M300 EMD *9	1,000	KPL		C
1	100	3061642	KEY 839306841 ABLOY CL109C	0,000	KPL		
1	150	8100533	4OE CROSS PIECE PACKING M300 880x400x280	1,000	KPL		07
Related Installation components							
8000	8100745	4OE	INSTALLATION KIT MCLS M300 55mm	1,000	KPL		01
8001	3061751		HEXAGON SOCKET HEAD SCREW M5x10-A2	4,000	KPL		
Related Drawings							
9000	9100601	3KE	CROSS PIECE SET MCSS 5176 M300 EMD	0,000	KPL		003

## SINGLE LEVEL

Last.revision: 04

Revision updated: 29.09.2008

Version: PLANNING

Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100962	4OE	MCSS 5176.1 28"/710mm M300 EMD CROSS PIECE SET	1,000	KPL		04
1	10	8100964	4ME CROSS PIECE PROFILE 710mm M300 EMD *1	1,000	kpl		001
1	20	8100967	4PE CROSS PIECE FRONT PLATE 710mm M300 EMD *2	1,000	KPL		001
1	30	8100969	4PE TRAFFIC LIGHT FRONT 710mm M300 EMD *3	1,000	KPL		002
1	40	8100971	4ME FASTENING BAR 710mm M300 EMD *4	2,000	kpl		001
1	50	8100398	4ME CONNECTOR COVER M300 *5	1,000	KPL		001
1	60	8100898	3ME CROSS PIECE FLANGE M300 EMD *6	2,000	kpl		006
1	70	8100952	4ME SCREW ADAPTER M300 EMD *7	8,000	KPL		003
1	80	8100975	4OE CROSS PIECE HATCH 710mm M300 EMD *8	1,000	KPL		02
1	90	8100055	4PE TYPE STICKER 20x40 MELS M300 EMD *9	1,000	KPL		C
1	100	3061642	KEY 839306841 ABLOY CL109C	0,000	KPL		
1	150	8100533	4OE CROSS PIECE PACKING M300 880x400x280	1,000	KPL		07
Related Installation components							
8000	8100745	4OE	INSTALLATION KIT MCLS M300 55mm	1,000	KPL		01
8001	3061751		HEXAGON SOCKET HEAD SCREW M5x10-A2	4,000	KPL		
Related Drawings							
9000	9100601	3KE	CROSS PIECE SET MCSS 5176 M300 EMD	0,000	KPL		003

## SINGLE LEVEL

Last.revision: 04

Revision updated: 29.09.2008

Version: PLANNING

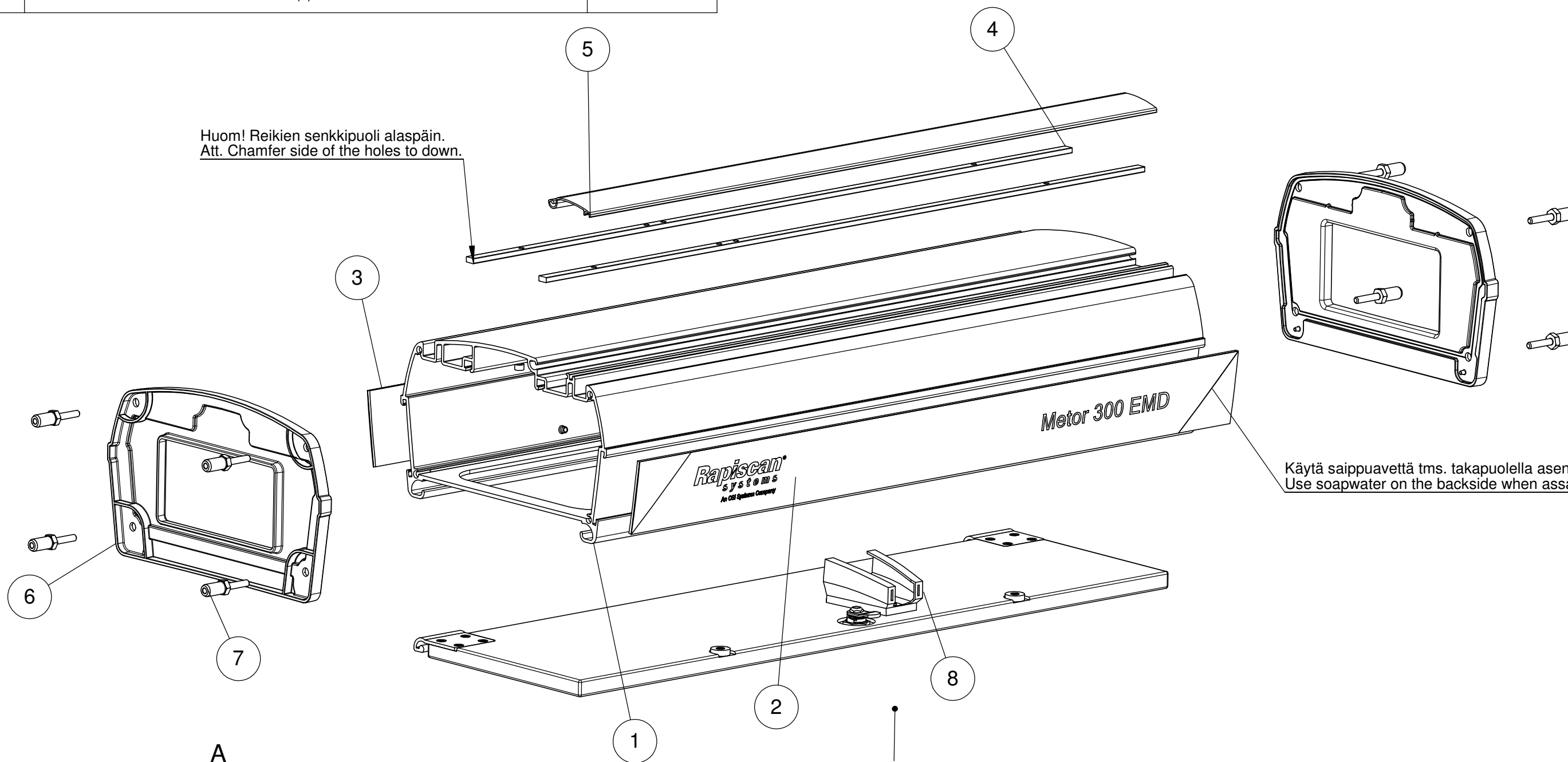
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100963	4OE	MCSS 5176.2 32"/813mm M300 EMD CROSS PIECE SET	1,000	KPL		04
1	10	8100965	4ME CROSS PIECE PROFILE 810mm M300 EMD *1	1,000	kpl		001
1	20	8100968	4PE CROSS PIECE FRONT PLATE 810mm M300 EMD *2	1,000	KPL		001
1	30	8100970	4PE TRAFFIC LIGHT FRONT 810mm M300 EMD *3	1,000	KPL		001
1	40	8100972	4ME FASTENING BAR 810mm M300 EMD *4	2,000	kpl		001
1	50	8100398	4ME CONNECTOR COVER M300 *5	1,000	KPL		001
1	60	8100898	3ME CROSS PIECE FLANGE M300 EMD *6	2,000	kpl		006
1	70	8100952	4ME SCREW ADAPTER M300 EMD *7	8,000	KPL		003
1	80	8100976	4OE CROSS PIECE HATCH 810mm M300 EMD *8	1,000	KPL		02
1	90	8100055	4PE TYPE STICKER 20x40 MELS M300 EMD *9	1,000	KPL		C
1	100	3061642	KEY 839306841 ABLOY CL109C	0,000	KPL		
1	150	8100533	4OE CROSS PIECE PACKING M300 880x400x280	1,000	KPL		07
Related Installation components							
8000	8100745	4OE	INSTALLATION KIT MCLS M300 55mm	1,000	KPL		01
8001	3061751		HEXAGON SOCKET HEAD SCREW M5x10-A2	4,000	KPL		
Related Drawings							
9000	9100601	3KE	CROSS PIECE SET MCSS 5176 M300 EMD	0,000	KPL		003

Revision	Description	Date
003	Position for remote control holder changed.	23.8.2007
002	Sticker (9) added	14.12.2006

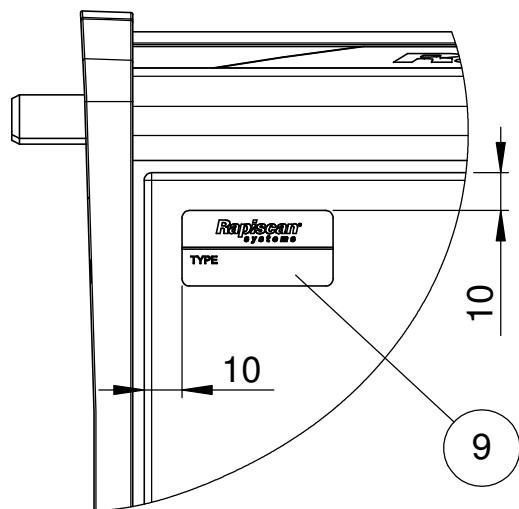
Huom! Reikien senkki puoli alaspäin.  
Att. Chamfer side of the holes to down.

Käytä saippuavettä tms. takapuolella asennusvaiheessa.  
Use soapwater on the backside when assambling.

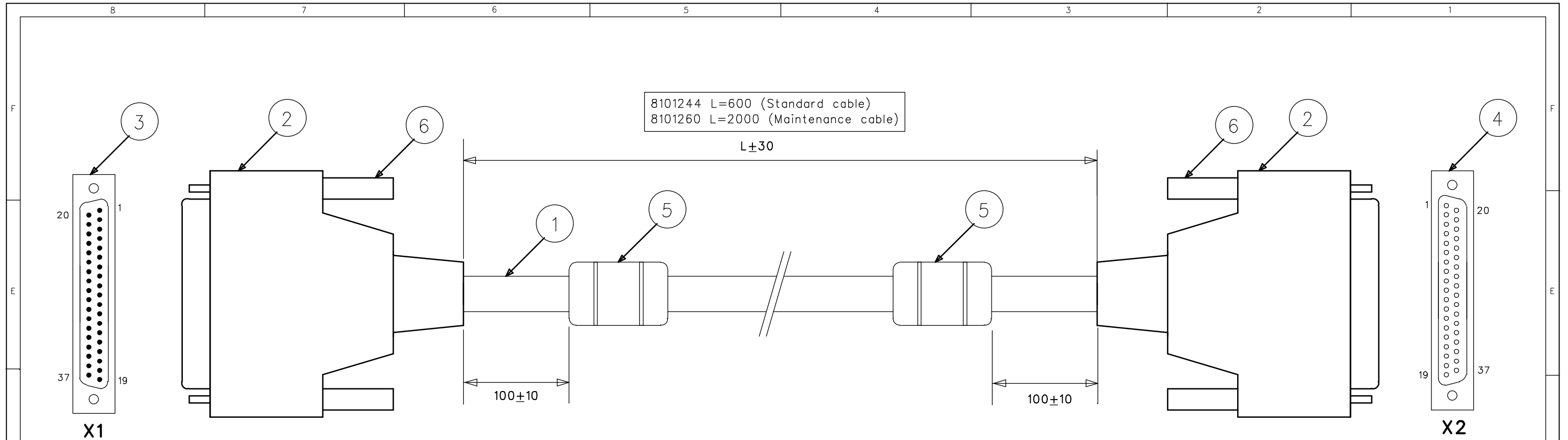


Direction A

A



YLEISTOLERANSSIT / TOLERANCES STANDARDIT / STANDARDS	AINE / MATERIAL / STANDARDI / STANDARD /		SUUNN. / DESIGNED / PVM DATE MVu / 30.12.2005
	PINTAKÄSITTELY / SURFACE TREATMENT		
SUHDE / SCALE 1:4	A3	VÄRI / COLOR	TUOTE / PRODUCT Metor
MASSA / MASS 12.81 Kg	MCSS 5176		HYV. / APPROVED / PVM DATE /
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PIIR.NRO. / DWG.NO 9100601		REV. 003	



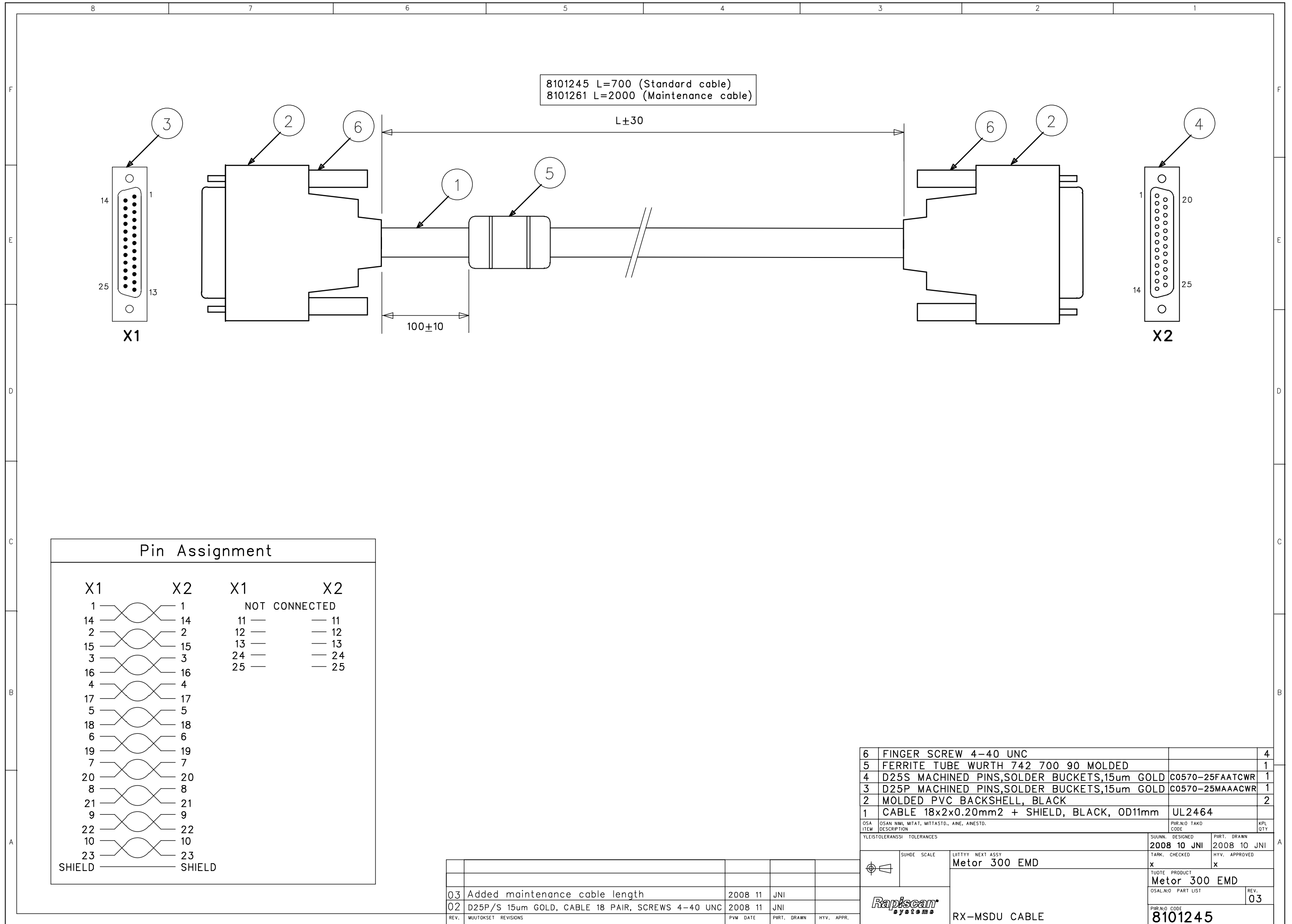
Pin Assignment			
X1	X2	X1	X2
1	1	10	10
20	20	29	29
2	2	11	11
21	21	30	30
3	3	12	12
22	22	31	31
4	4	13	13
23	23	32	32
5	5	14	14
24	24	33	33
6	6	15	15
25	25	34	34
7	7	16	16
26	26	35	35
8	8	17	17
27	27	36	36
9	9	18	18
28	28	37	37
S	S	19	19

REV.	MUUTOKSET	REVISIONS	PVM	DATE	PRT.	DRAWN	HYV.	APPR.
03		Added maintenance cable length		2008 11	JNI			
02		D37P/S 15um GOLD, SCREWS 4-40 UNC		2008 11	JNI			

6	FINGER SCREW 4-40 UNC		4
5	FERRITE TUBE WURTH 742 700 90 MOLDED		2
4	D37S MACHINED PINS,SOLDER BUCKETS,15um GOLD	C0570-37FAATCWR	1
3	D37P MACHINED PINS,SOLDER BUCKETS,15um GOLD	C0570-37MAACWR	1
2	MOLDED PVC BACKSHELL, BLACK		2
1	CABLE 18x2x0.20mm2 + SHIELD, BLACK, OD11mm	UL2464	
OSA ITEM	OSAN NML MITAT, MITTASTD., ANE, ANESTD.	PIIR.NO TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIRT. DRAWN
		2008 10 JNI	2008 10 JNI
		TARK. CHECKED	HYV. APPROVED
		x	x
		TUOTE PRODUCT	
		Metor 300 EMD	
		OSAL.NO PART LIST	REV.
			03
		PIIR.NO CODE	
		8101244	



RX+TX Cable



8101245 L=700 (Standard cable)  
8101261 L=2000 (Maintenance cable)

$L \pm 30$

$100 \pm 10$

X1

X2

Pin Assignment

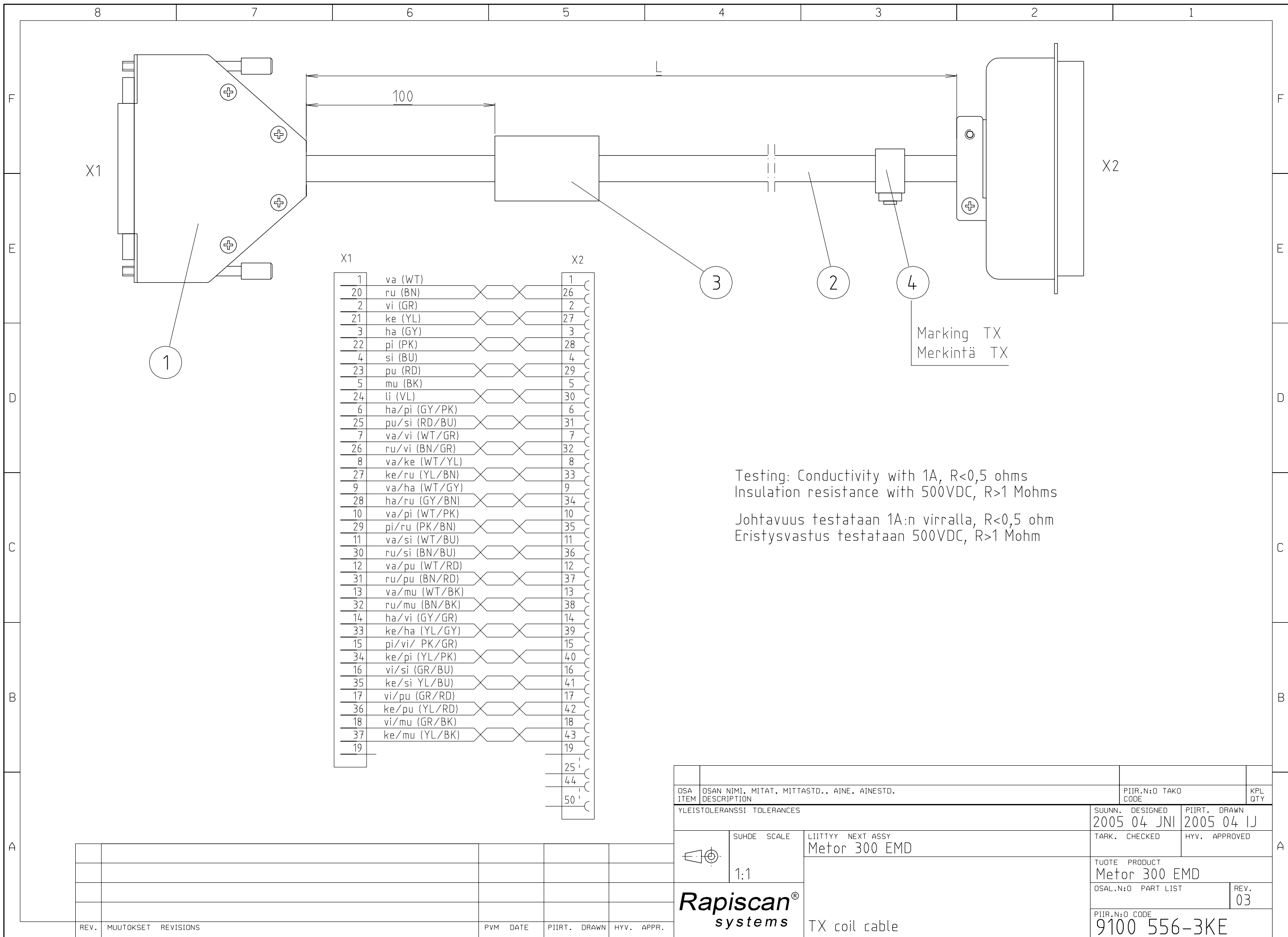
X1	X2	X1	X2
1	1	NOT CONNECTED	
14	14	11	11
2	2	12	12
15	15	13	13
3	3	24	24
16	16	25	25
4	4		
17	17		
5	5		
18	18		
6	6		
19	19		
7	7		
20	20		
8	8		
21	21		
9	9		
22	22		
10	10		
23	23		
SHIELD	SHIELD		

REV.	MUUTOKSET	REVISIONS	PVM	DATE	PRT.	DRAWN	HYV.	APPR.
03		Added maintenance cable length		2008 11	JNI			
02		D25P/S 15um GOLD, CABLE 18 PAIR, SCREWS 4-40 UNC		2008 11	JNI			

6	FINGER SCREW 4-40 UNC		4
5	FERRITE TUBE WURTH 742 700 90 MOLDED		1
4	D25S MACHINED PINS,SOLDER BUCKETS,15um GOLD	C0570-25FAATCWR	1
3	D25P MACHINED PINS,SOLDER BUCKETS,15um GOLD	C0570-25MAAACWR	1
2	MOLDED PVC BACKSHELL, BLACK		2
1	CABLE 18x2x0.20mm2 + SHIELD, BLACK, OD11mm	UL2464	
OSA ITEM	OSAN NML MITAT, MITTASTD., ANE, ANESTD.	PIR.N0 TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIRT. DRAWN
		2008 10 JNI	2008 10 JNI
		TARK. CHECKED	HYV. APPROVED
		x	x
		TUOTE PRODUCT	
		Metor 300 EMD	
		OSAL.N0 PART LIST	REV.
			03
		PIR.N0 CODE	
		8101245	



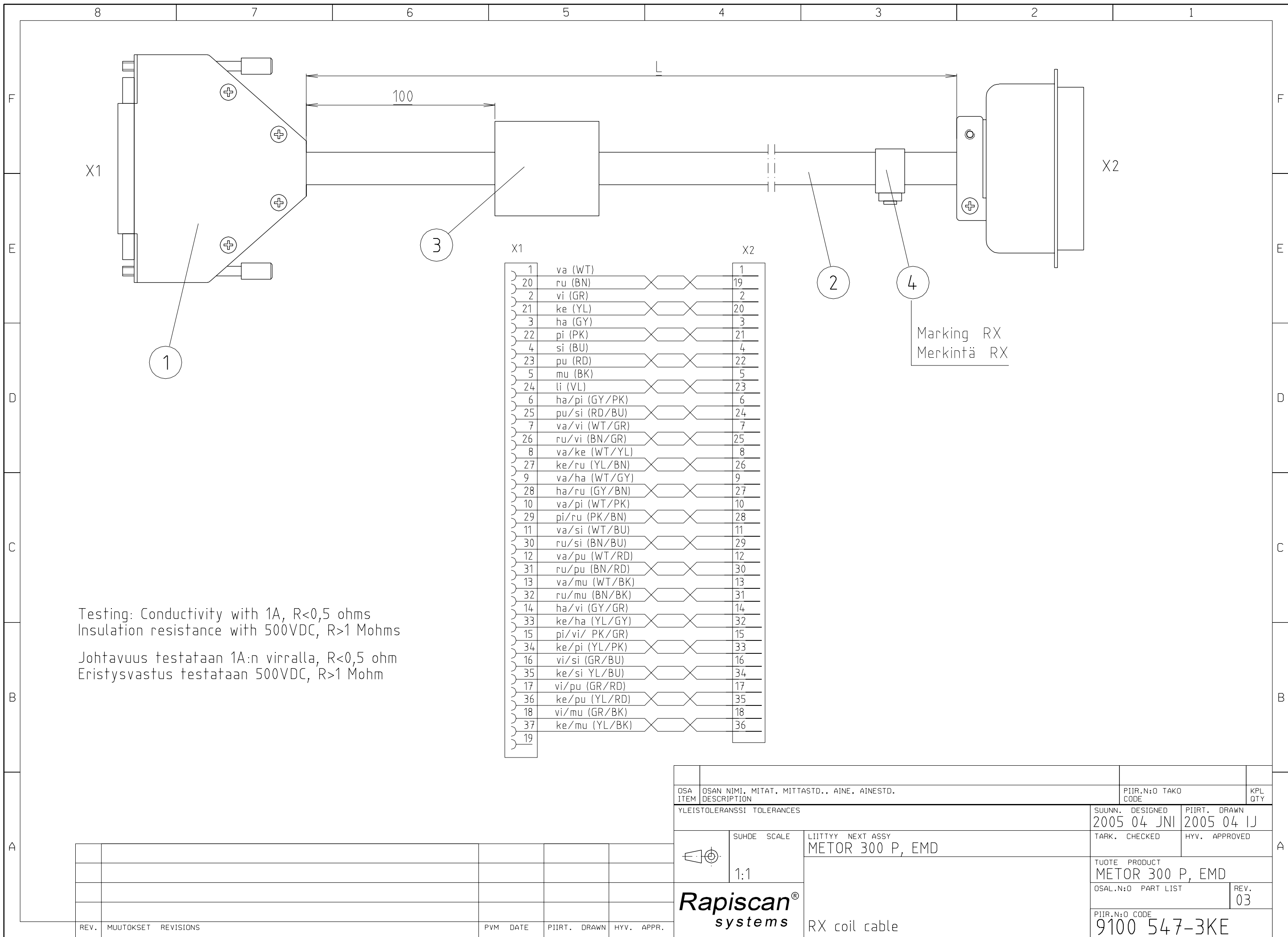
RX-MSDU CABLE



X1		X2	
1	va (WT)	1	1
20	ru (BN)	26	26
2	vi (GR)	2	2
21	ke (YL)	27	27
3	ha (GY)	3	3
22	pi (PK)	28	28
4	si (BU)	4	4
23	pu (RD)	29	29
5	mu (BK)	5	5
24	li (VL)	30	30
6	ha/pi (GY/PK)	6	6
25	pu/si (RD/BU)	31	31
7	va/vi (WT/GR)	7	7
26	ru/vi (BN/GR)	32	32
8	va/ke (WT/YL)	8	8
27	ke/ru (YL/BN)	33	33
9	va/ha (WT/GY)	9	9
28	ha/ru (GY/BN)	34	34
10	va/pi (WT/PK)	10	10
29	pi/ru (PK/BN)	35	35
11	va/si (WT/BU)	11	11
30	ru/si (BN/BU)	36	36
12	va/pu (WT/RD)	12	12
31	ru/pu (BN/RD)	37	37
13	va/mu (WT/BK)	13	13
32	ru/mu (BN/BK)	38	38
14	ha/vi (GY/GR)	14	14
33	ke/ha (YL/GY)	39	39
15	pi/vi/ PK/GR)	15	15
34	ke/pi (YL/PK)	40	40
16	vi/si (GR/BU)	16	16
35	ke/si YL/BU)	41	41
17	vi/pu (GR/RD)	17	17
36	ke/pu (YL/RD)	42	42
18	vi/mu (GR/BK)	18	18
37	ke/mu (YL/BK)	43	43
19		19	19
		25	25
		44	44
		50	50

Testing: Conductivity with 1A,  $R < 0,5$  ohms  
 Insulation resistance with 500VDC,  $R > 1$  Mohms  
 Johtavuus testataan 1A:n virralla,  $R < 0,5$  ohm  
 Eristysvastus testataan 500VDC,  $R > 1$  Mohm

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2005 04 JN1	PIIRT. DRAWN 2005 04 IJ
SUHDE SCALE 1:1		TARK. CHECKED	HYV. APPROVED
LIITTYY NEXT ASSY Metor 300 EMD		TUOTE PRODUCT Metor 300 EMD	
Rapiscan® systems		OSAL.N:O PART LIST	
TX coil cable		REV. 03	
REV. MUUTOKSET REVISIONS		PIIR.N:O CODE 9100 556-3KE	
PVM DATE	PIIRT. DRAWN	HYV. APPR.	



Testing: Conductivity with 1A,  $R < 0,5$  ohms  
 Insulation resistance with 500VDC,  $R > 1$  Mohms

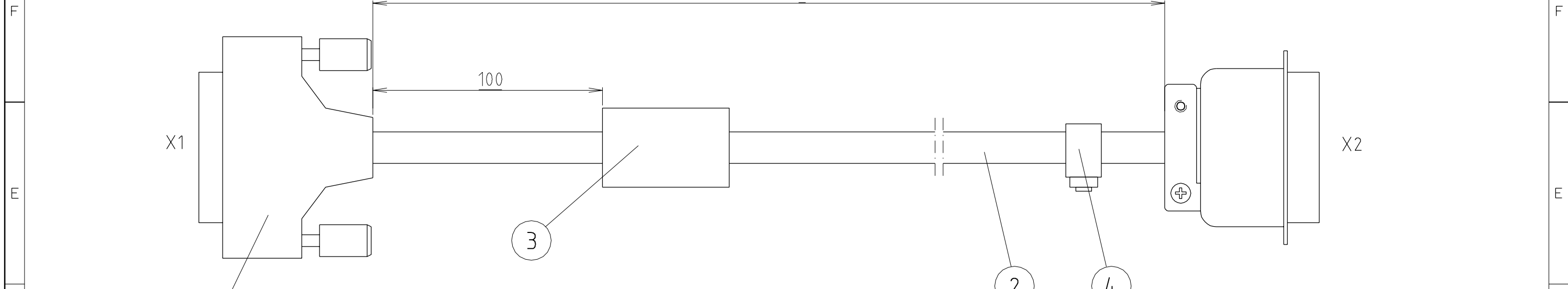
Johtavuus testataan 1A:n virralla,  $R < 0,5$  ohm  
 Eristysvastus testataan 500VDC,  $R > 1$  Mohm

X1		X2	
1	va (WT)	1	1
20	ru (BN)	19	19
2	vi (GR)	2	2
21	ke (YL)	20	20
3	ha (GY)	3	3
22	pi (PK)	21	21
4	si (BU)	4	4
23	pu (RD)	22	22
5	mu (BK)	5	5
24	li (VL)	23	23
6	ha/pi (GY/PK)	6	6
25	pu/si (RD/BU)	24	24
7	va/vi (WT/GR)	7	7
26	ru/vi (BN/GR)	25	25
8	va/ke (WT/YL)	8	8
27	ke/ru (YL/BN)	26	26
9	va/ha (WT/GY)	9	9
28	ha/ru (GY/BN)	27	27
10	va/pi (WT/PK)	10	10
29	pi/ru (PK/BN)	28	28
11	va/si (WT/BU)	11	11
30	ru/si (BN/BU)	29	29
12	va/pu (WT/RD)	12	12
31	ru/pu (BN/RD)	30	30
13	va/mu (WT/BK)	13	13
32	ru/mu (BN/BK)	31	31
14	ha/vi (GY/GR)	14	14
33	ke/ha (YL/GY)	32	32
15	pi/vi/ PK/GR)	15	15
34	ke/pi (YL/PK)	33	33
16	vi/si (GR/BU)	16	16
35	ke/si YL/BU)	34	34
17	vi/pu (GR/RD)	17	17
36	ke/pu (YL/RD)	35	35
18	vi/mu (GR/BK)	18	18
37	ke/mu (YL/BK)	36	36
19			

Marking RX  
 Merkintä RX

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2005 04 JNI	PIIRT. DRAWN 2005 04 IJ
SUHDE SCALE 1:1		TARK. CHECKED	HYV. APPROVED
		LIITTYY NEXT ASSY METOR 300 P, EMD	
		TUOTE PRODUCT METOR 300 P, EMD	
REV. MUUTOKSET REVISIONS		OSAL.N:O PART LIST	REV. 03
PVM DATE	PIIRT. DRAWN	PIIR.N:O CODE 9100 547-3KE	
HYV. APPR.		RX coil cable	





X1

X2

1

3

2

4

X1		X2
1	va (WT)	1
14	ru (BN)	13
2	vi (GR)	2
15	ke (YL)	14
3	ha (GY)	3
16	pi (PK)	15
4	si (BU)	4
17	pu (RD)	16
5	mu (BK)	5
18	li (VL)	17
6	ha/pi (GY/PK)	6
19	pu/si (RD/BU)	18
7	va/vi (WT/GR)	7
20	ru/vi (BN/GR)	19
8	va/ke (WT/YL)	8
21	ke/ru (YL/BN)	20
9	va/ha (WT/GY)	9
22	ha/ru (GY/BN)	21
10	va/pi (WT/PK)	10
23	pi/ru (PK/BN)	22
11		11
24		23
12		12
25		24
13		

Marking RX -MSDU  
Merkintä RX -MSDU

Testing: Conductivity with 1A, R<0,5 ohms  
Insulation resistance with 500VDC, R>1 Mohms

Johtavuus testataan 1A:n virralla, R<0,5 ohm  
Eristysvastus testataan 500VDC, R>1 Mohm

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2005 04 JNI	PIIRT. DRAWN 2005 04 IJ
SUHDE SCALE 1:1		TARK. CHECKED	HYV. APPROVED
LIITTYY NEXT ASSY Metor 300 EMD		TUOTE PRODUCT Metor 300 EMD	
Rapiscan® systems		OSAL.N:O PART LIST	
RX - MSDU cable		REV. 03	
		PIIR.N:O CODE 9100 557-3KE	

**MELS 5172 Electronics Set**

## SINGLE LEVEL

Last.revision: 05

Revision updated: 14.1.2008

Version: PLANNING

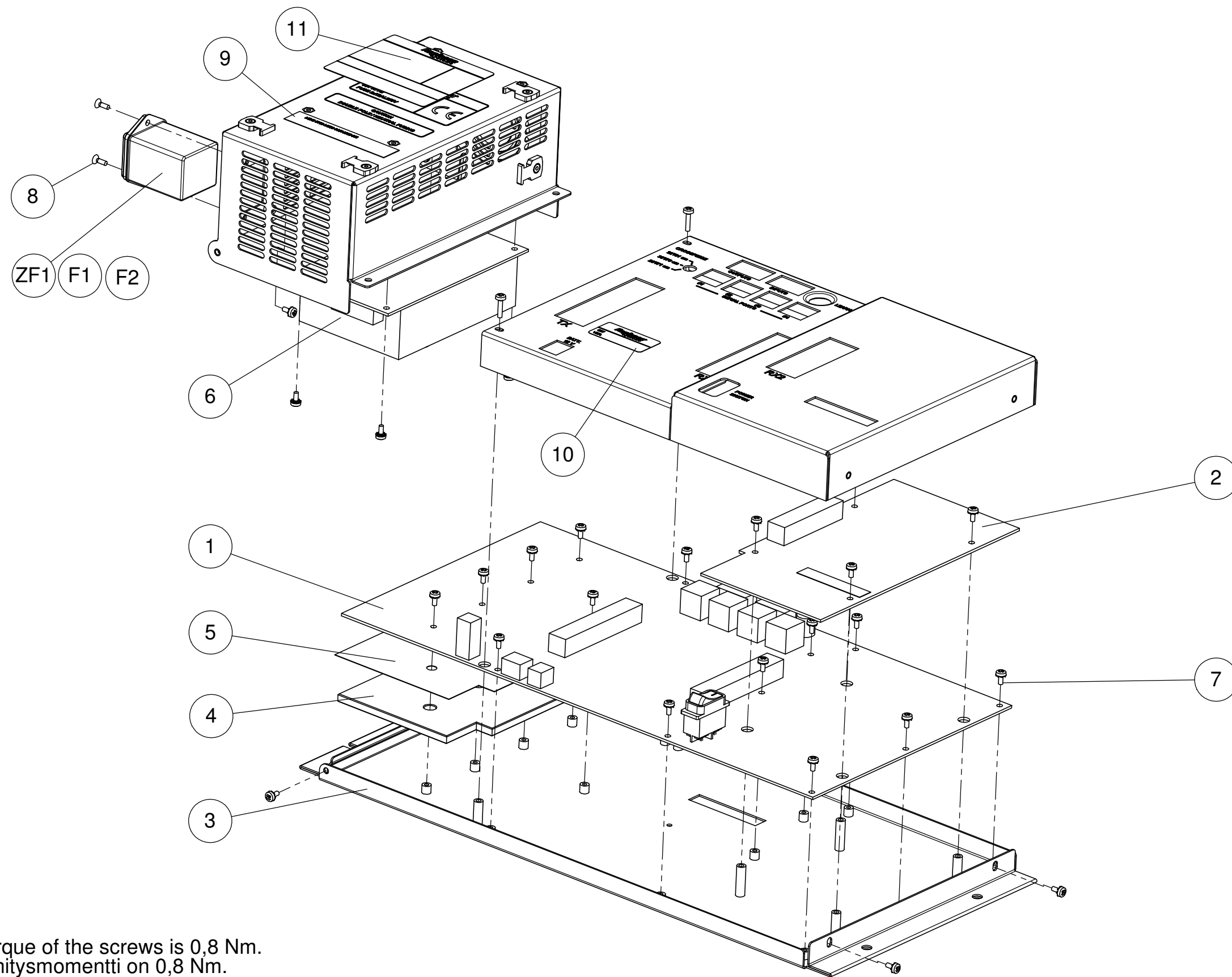
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100883	4OE	MELS 5172 ELECTRONICS SET M300 EMD	1,000	KPL		05
1	10	8100885	4OE MCCU 5174 M300EMD CONTROL AND COMMUNICATION UNIT *1	1,000	KPL		10
1	20	8100886	4OE MSDU 5175 M300EMD SIGNAL DETECTIONUNIT *2	1,000	KPL		04
1	30	8100469	4OE AC-CABLE M300	1,000	KPL		04
1	40	8100470	4OE GROUND CABLE M300	1,000	KPL		01
1	50	8100926	4OE DC-POWER CABLE M300 EMD	1,000	KPL		03
1	60	8101023	4OE ELECTRONICS BOX M300 EMD *3	1,000	KPL		02
1	70	8100945	3ME COOLING PLATE M300 EMD *4	1,000	kpl		005
1	80	8100966	4ME GAP PAD M300 EMD *5	1,000	kpl		002
1	85	8100631	4PE S/N LABEL BASE 14x76 *9	1,000	KPL		A
1	86	8101044	4PE SW STICKER 20x40 *10	1,000	KPL		01
1	88	8101158	4PE MELS 5172 PRODUCT LABEL TEXT M310 emd *11 (only Metor 310 emd)	1,000	KPL	O1	01
1	90	3061683	AC/DC-POWER SUPPLY 85-264VAC/12V,100W WITH PFC LAMBDA ZPS100 *6	1,000	KPL		
1	100	3061673	MAINS FILTER 2A FN9260-2/06 SCHAFFNER or TIMONTA FKF2-45-2/I *ZF1	1,000	KPL		
1	110	1330935	FUSE GLASS TUBE 5x20MM T2AL/H250V IEC/UL GMC-2A COOPER BHUSSMANN *F1,2	2,000	KPL		
1	120	3061740	PAN HEAD SCREW M3x6 A2 WITH STAR WASHER DIN6900-4 *7	23,000	KPL		
1	130	3061311	COUNTERSUNK FLAT HEAD SCREW M3x8-A2-Z-AISI 304 *8	2,000	KPL		

Related Drawings

SINGLE LEVEL

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100883	4OE	MELS 5172 ELECTRONICS SET M300 EMD	1,000	KPL		05
9000	9100627	3KE	ELECTRONICS SET MELS 5172 M300 EMD	0,000	KPL		010
9001	9100636	4VE	OPERATIONAL DESCRIPTION MELS 5172 M300 EMD	0,000	KPL		1.10
9002	9100570	4XE	TEST SPESIFICATION MELS 5174 M300 EMD	0,000	KPL		3.00
9003	9100786	4XE	INCOME INSPECTION MELS/MDPU/MRCU M300 EMD	0,000	KPL		1.00



Fastening torque of the screws is 0,8 Nm.  
 Ruuvien kiinnitysmomentti on 0,8 Nm.

Revision	Description	Date
010	Sticker (11) added	3.10.2007

YLEISTOLERANSSIT TOLERANCES STANDARDIT STANDARDS		AINE MATERIAL / STANDARDI STANDARD /		SUUNN. DESIGNED / PVM DATE <b>MVu / 27.10.2006</b>	
		PINTAKÄSITTELY SURFACE TREATMENT /		TARK. CHECKED / PVM DATE /	
SUHDE SCALE <b>1:2.5</b> A3 MASSA MASS		VÄRI COLOR /		TUOTE PRODUCT <b>Metor</b>	
		<b>MELS 5172</b> <b>MELS 5172</b>		3D-TIEDOSTO LIITTYY 3D-FILE APPENDIX <input type="checkbox"/>	
				TARKASTUSOHJE LIITTYY QUALITY CONTROL APPENDIX <input type="checkbox"/>	
				PIIR.NRO. DWG.NO <b>9100627</b>	
				REV. <b>010</b>	

Author J Niemi	Rev. 1.10	Code 9100 636-4VE
Approved ORA	Date 12.9.2007	Document
Product Metor 300 EMD		Archives Metor 300 EMD
Title <b>OPERATIONAL DESCRIPTION MELS 5172</b>		

## ELECTRONICS SET, MELS 5172

### 1 GENERAL

The MELS consists of the following modules:

- Motherboard (MCCU 5174)
- Signal Detector add-on board (MSDU 5175)
- 12V universal power supply
- Power inlet including filter and two fuses
- Optional FAN
- Power switch
- Learn switch

In the following is a description how to replace the MELS components. Separate documents describe more in-depth description of the functions in the units.

**WARNING: Line voltage is present inside the electronics unit. Always remove the power cord from the MELS before servicing it.**

### 2 MOTHERBOARD (MCCU 5174)

This is the main electronics board. It contains the main processor, ten signal detector channels, eight transmitters, A/D –converter, sockets for the MSDU board etc. All the external units i.e. coil cables, Display Unit, Traffic Lights, Remote Display etc. are connected to the MCCU.

#### 2.1 Replacing the motherboard

- Disconnect all cables from the MELS and remove it from the crosspiece.
- Remove the four M3 panhead (PZ1) screws that hold the MELS cover in place and remove the cover
- Flip the power supply cover open (the two screws on the sides operate as hinges)
- Disconnect the internal cables coming from the power supply compartment to MCCU
- Remove the four panhead screws (PZ1, M3x8) holding the MSDU in place and remove the board
- Remove the 14 panhead screws (PZ1, M3x8) holding the MCCU in place.
- Withdraw the MCCU from the MELS
- Remove the aluminum plate from the bottom of the MCCU.

- Install the new MCCU in reverse order.

### 3 SIGNAL DETECTOR BOARD (MSDU 5175)

The MELS contains an eight channel signal detector add-on board. It is connected to the MCCU by two 40 pin headers and four M3 screws. This board amplifies and filters signals from receiver coils 13-19.

#### 3.1 Replacing the Signal Detector Unit

- Disconnect all cables from the MELS
- Remove the four M3 panhead (PZ1) screws that hold the MELS cover in place and remove the cover
- Remove the four panhead screws (PZ1, M3x8) holding the MSDU in place and remove the board
- Installation is reverse to removing

### 4 POWER SUPPLY AND ASSOCIATED COMPONENTS

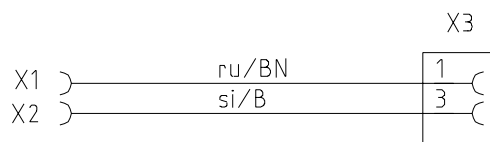
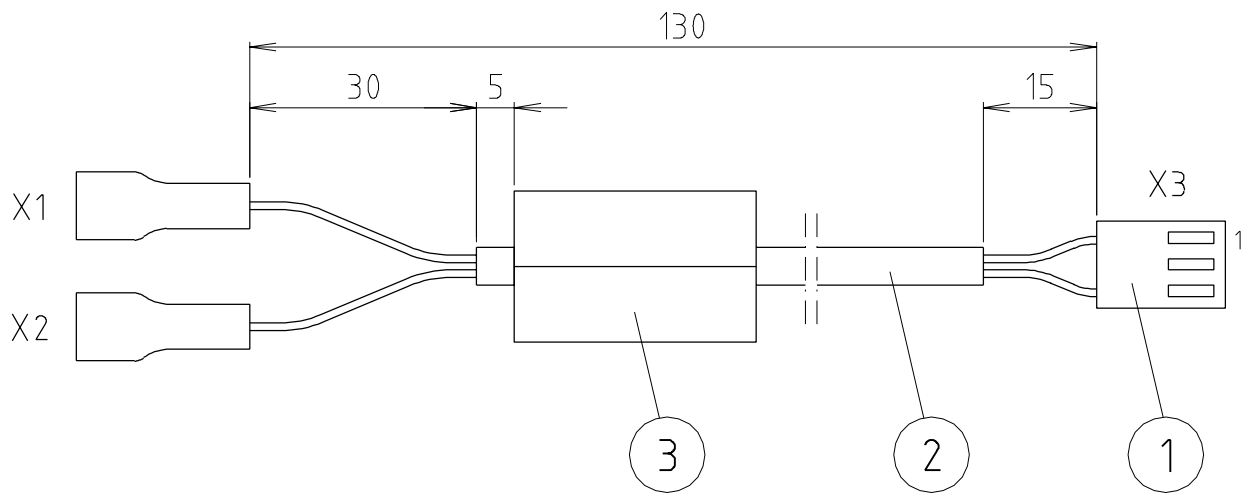
The MELS contains an universal input (100-230V, 50/60Hz), 100W 12VDC power supply. All components connected to the line voltage are enclosed under separate cover. To gain access to this compartment, remove first the MELS cover and then the power supply cover.



**CAUTION:**  
**DOUBLE POLE / NEUTRAL FUSING**

### 5 AUXILARY DC –POWER SWITCH

This (optional) switch is visible when the crosspiece lid is closed. Both power switches are connected in parallel on the MCCU board.

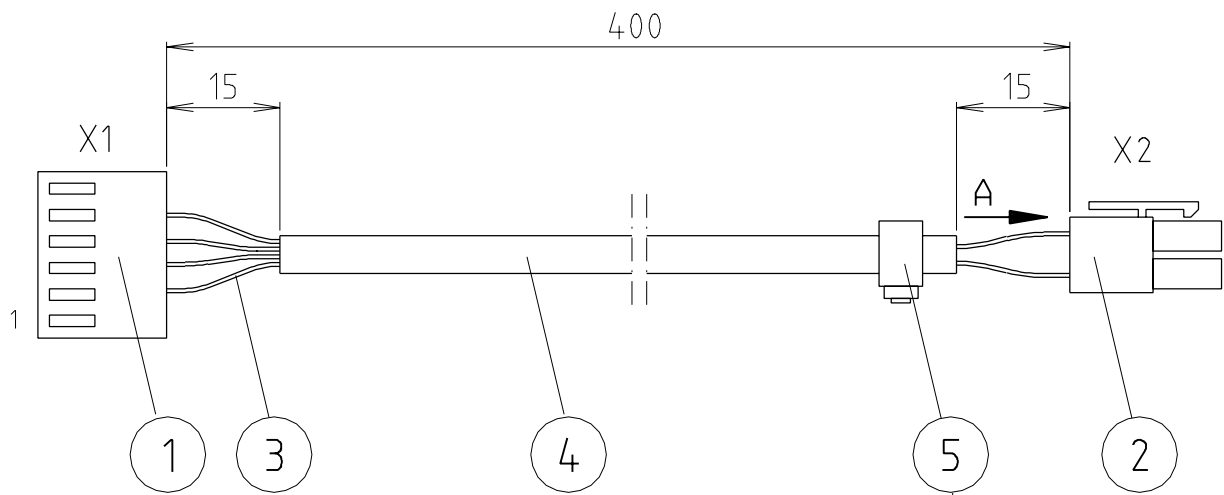
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REV.	MUUTOKSET REVISIONS	PVM DATE			PIIRT. DRAWN	HYV. APPR.	
a	Lisätty osa/Added part 3	2004 01			IJ	ORA	



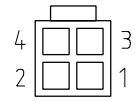
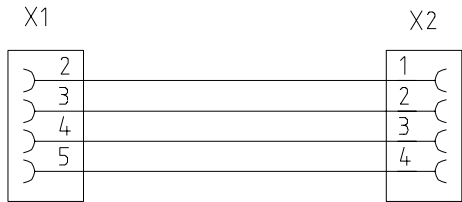
OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION		PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES			SUUNN. DESIGNED 2001 10 JN1	PIIRT. DRAWN 2001 10 IJ
	SUHDE SCALE 1:1	LIITTYY NEXT ASSY MELS 5006	TARK. CHECKED 2003 09 JN1	HYV. APPROVED 2003 09 ORA
			TUOTE PRODUCT Metor 300	OSAL.N:O PART LIST 8100 469-40
REV. A				
AC-cable			PIIR.N:O CODE 9100 318-4KE	



4		3		2		1		
REV.	MUUTOKSET REVISIONS					PVM DATE	PIIRT. DRAWN	HYV. APPR.



Marking MCCU/X21  
 Merkinä MCCU/X21



Suunta A  
 Direction A

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION				PIIR.N:O TAKO CODE	KPL QTY					
YLEISTOLERANSSI TOLERANCES					SUUNN. DESIGNED 2005 11 JN1	PIIRT. DRAWN 2005 11 IJ					
SUHDE SCALE 1:1		LIITTYY NEXT ASSY MELS 5172		TARK. CHECKED	HYV. APPROVED						
		DC-Power cable				TUOTE PRODUCT Metor 300 EMD					
						OSAL.N:O PART LIST 8100 926-40				REV. 02	
						PIIR.N:O CODE 9100 584-4KE					

Author J Niemi	Rev. 1.10	Code 9100 641-4VE
Approved ORA	Date 12.9.2007	Document
Product Metor 300 EMD		Archives Metor 300 EMD
Title <b>OPERATIONAL DESCRIPTION MCCU 5172</b>		

## CONTROL AND COMMUNICATIONS UNIT, MCCU 5172

### 1 GENERAL

The main components located on the MCCU are: a Digital Signal Processor, a 16-bit serial A/D –converter, three 8-channel analog multiplexers, a real time clock (RTC), 32 Kbytes serial EEPROM, a Field Programmable Gate Array (FPGA), ten signal detector channels, eight transmitters, two relay outputs, two digital inputs and four serial ports. All the external units i.e. coil cables, display unit, remote display etc. are connected to the MCCU.

### 2 OPERATIONAL DESCRIPTION

#### 2.1 Signal Chain

Signal from receiver channel is first amplified by an instrumentation amplifier (INA163). Then an analog switch (DG211) is used to reject other transmitter frequencies and to split the signal to real and imaginary components. Next the DC -offset is nulled with a D/A –converter (AD5628).

Metal signals from signal detector channels are demultiplexed and then fed to A/D –converter. The FPGA reads conversion results from the A/D –converter and removes noise by digital filtering. Finally the processor reads data from the FPGA and calculates the amount of metal.

#### 2.2 Power Supplies

The M300 EMD is powered by a universal 12V power supply. The MCCU has eight separate linear low drop regulators, one for each transmitter channel, to regulate the transmitter voltage (9.8V).  $\pm 5V$  and  $\pm 10V$  for the analog circuitry is created by a DC/DC –converter and regulators. Digital 3.3V power is generated by a DC/DC –converter. 1.2V, 1.9V and 2.5V for the digital parts are regulated from the 3.3V supply. Analog 3.3V for DSP is regulated from the 12V supply.

A power fail detection circuit monitors the 12V power supply voltage and switches to battery when the 12V supply drops below 10.6V. A dual schottky diode prevents current from the battery from flowing to the power supply and vice versa.

The 12V power supply is connected to MRXU, MTXU and serial ports via resettable fuses located next to each connector on the MCCU.

## 2.3 Real Time Clock

The MCCU is equipped with a Real Time Clock circuit. This circuit is powered from a lithium battery (CR2032) when power is turned off the gate. Lifetime of the battery is over ten years and is limited by its self discharge current.

**CAUTION:**  
*RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.*

## 2.4 EEPROM

On the MCCU is two 16kByte serial EEPROM that are connected via I2C bus to the microcontroller. These memories are used to store all the adjustable parameters.

## 2.5 Reset

A reset circuit monitors the 3.3V and 12V power supplies and resets the microcontroller and the FPGA when the 12V supply voltage drops below 10V or the 3.3V supply drops below 2.93V.

## 2.6 Oscillator

A 30MHz clock oscillator is connected to the DSP and the FPGA. The DSP contains a PLL that multiplies its internal clock by five to 150MHz.

## 2.7 Serial Ports

On the MCCU is four RJ45 serial port connectors; one is for the Display Unit, one for Remote Display, one for Traffic Light and one is for MeteorNet. All connectors share the same signals and pinout. The serial port signals are buffered by two ESD tolerant buffer ICs.

## 2.8 Self Diagnosis

The self diagnostic circuitry has the following features:

- Built in A/D –converter in the DSP is used to monitor all supply voltages.
- Signals /CCDET, /RX\_DET1 & 2 and /TX\_DET have pull-up's and are grounded at the MRXU and MTXU boards, respectively. These signals are used to verify that the RX and TX -cables are connected.
- Signal /RX\_FAIL1...19 goes LOW if the receiver coil is disconnected or open. Shorted coil is not detected.
- Transmitter current monitor circuit on each channel sets /TX\_FAIL1...8 signal LOW if no or low current goes to any one of the transmitter coils 1...8, respectively.
- A temperature sensor is used to monitor the MCCU temperature. Sensor output is 500mV+10mV per degrees Celsius.
- The /FPGA\_OK signal goes LOW when the FPGA is configured properly. This signal controls the red LED on the MCCU.

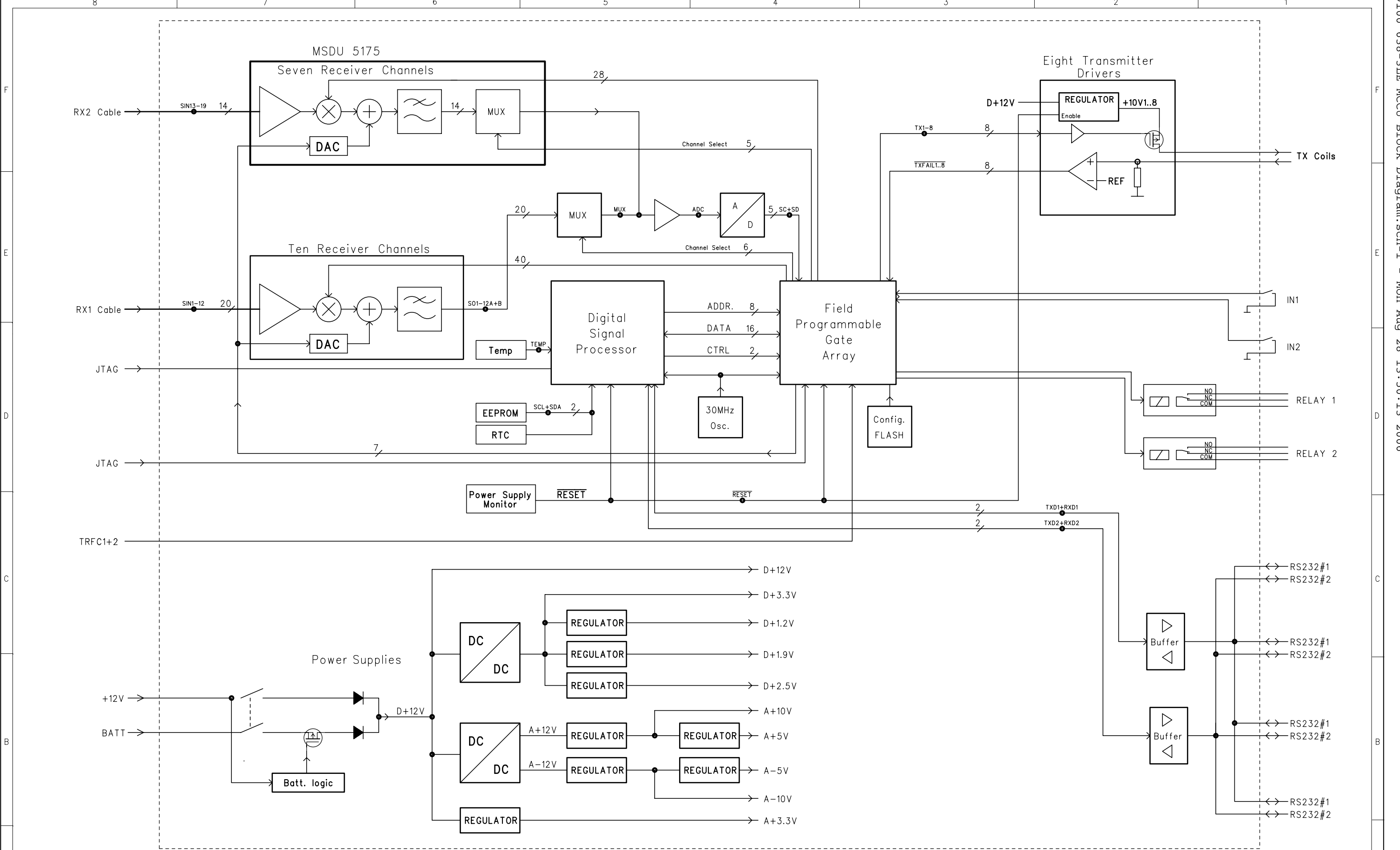
### 3 TEST POINT SIGNALS

In the following table is listed DC-voltages at relevant testpoints:

Testpoint	Low limit	Nominal Voltage	High Limit
TEMP		500mV+10mV/°C	
Ref-5V	-5.1V	-5.0V	-4.9V
D+3.3V	3.14V	3.3V	3.45V
D+2.5V	2.375V	2.5V	2.625V
D+1.9V	1.81V	1.9V	2.0V
D+1.2V	1.14V	1.2V	1.26V
D+12V	11.0V	11.5V	15.0V (on battery)
A+5V	4.5V	5.0V	5.5V
A-5V	-5.5V	-5.0V	-4.5V
A+10V	9.5V	10.0V	10.5V
A-10V	-10.5V	-10.0V	-9.5V
+10V1...8	9.6V	9.8V	10.0V

In the following table is listed testpoints used for diagnostics:

Testpoint	Description
TXD1	Transmit data to Display and Remote Display Unit
RXD1	Receive data from Display Unit
TXD2	Transmit data to MeteorNet
RXD2	Receive data from MeteorNet
MUX	All signal detector channels multiplexed, ±5V span
ADC	All signal detector channels multiplexed, ±2.5V span
SCL	I2C clock to real time clock and EEPROM memory
SDA	I2C data to real time clock and EEPROM memory
SD	A/D –converter data
SC	A/D –converter clock
TX1...8	Transmitter driver control
SIN1...12	Amplified signal from receiver coil 1...8
SO1...12A	Signal detector channel output, in phase signal
SO1...12B	Signal detector channel output, out of phase signal
TRFC1	Traffic counter (photocell)1, high pulse on walkthrough
TRFC2	Traffic counter (photocell) 2, high pulse on walkthrough
/RESET	Low resets the DSP and the FPGA



REV.	MUUTOKSET REVISIONS	PVM DATE	PIRT. DRAWN	HYV. APPR.

OSA ITEM DESCRIPTION	OSAN NIIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIIRT. DRAWN
		2006 08 JUNI	2006 08 JUNI
		TARK. CHECKED	HYV. APPROVED
		TUOTE PRODUCT	
		Metor 300 EMD	
		OSAL.N:O PART LIST	REV. 01
		PIIR.N:O CODE	9100 638-3LE



MCCU 5174  
Block diagram

100 638-3LE MCCU Block Diagram, sch-1 - Mon Aug 28 13:50:13 2006

Author M. Loikkanen	Rev. 1.00	Code 9100 645-4VE
Approved	Date 30.8.2006	Document
Product Metor 300 EMD		Archives M300 EMD
Title <b>OPERATIONAL DESCRIPTION MSDU 5175</b>		

## **SIGNAL DETECTION UNIT, MSDU 5175**

### **1 GENERAL**

The MSDU consists of seven signal detector channels with two 8-channel DACs, two 8-channel analog multiplexers, voltage regulators and references, connector for RX-MSDU cable and connectors for the MCCU 5174 board.

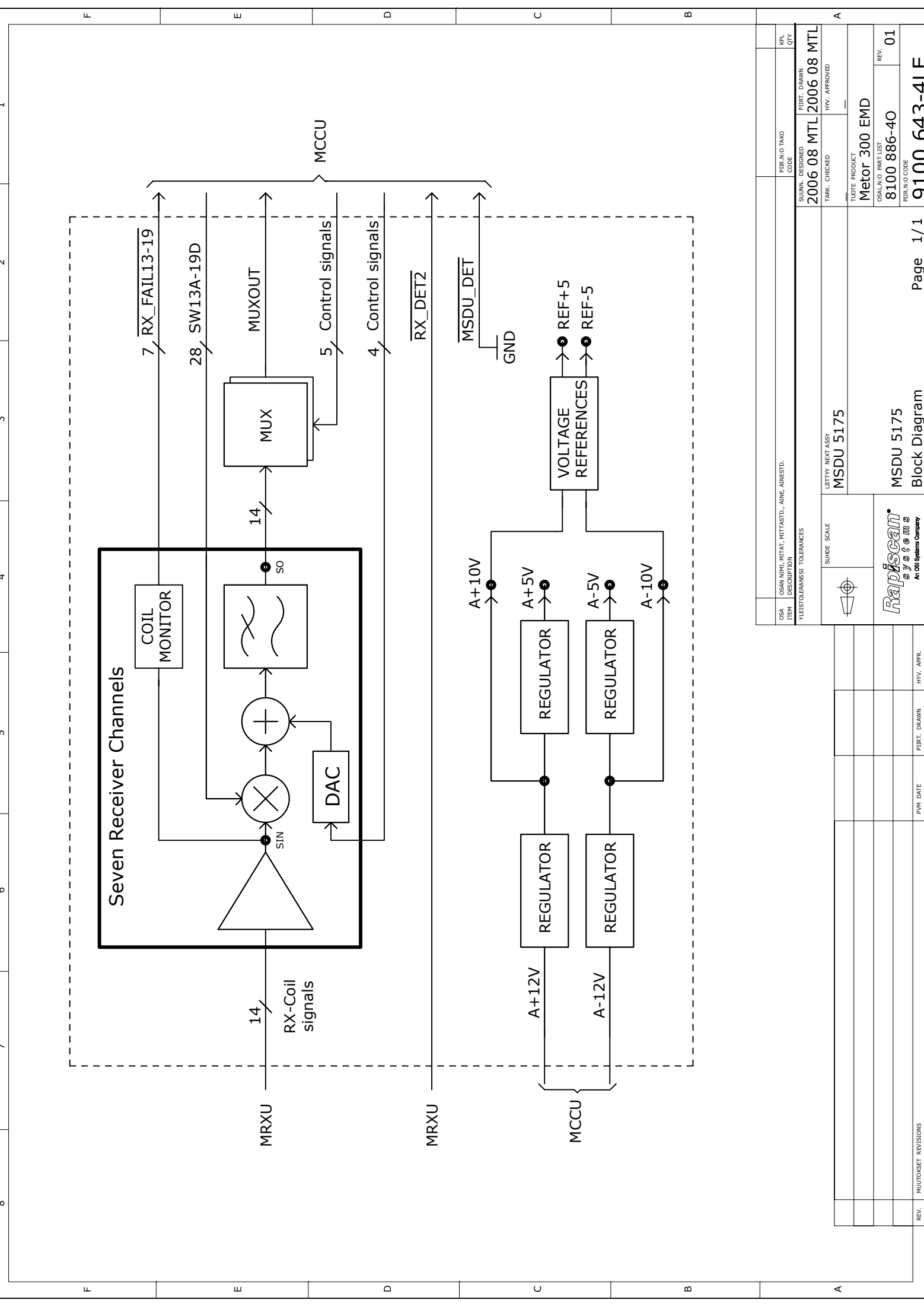
### **2 OPERATIONAL DESCRIPTION**

#### **2.1 Signal Chain**

The signal detector channels are operationally the same as the ones on the MCCU board. Signal from receiver channel is first amplified by an instrumentation amplifier (INA163). Then an analog switch (DG211) is used to reject other transmitter frequencies and to split the signal to real and imaginary components. Next the DC offset is nulled with a D/A converter (AD5628). Finally the signal is filtered with a low-pass filter and the resulting metal signal is routed to the MCCU through a multiplexer.

#### **2.2 Power Supplies**

The MSDU board gets its power from the MCCU. It has  $\pm 10V$  and  $\pm 5V$  regulators and  $\pm 5V$  references on board to create necessary voltages.



OSÄ ITEM	OSÄ NIMI, MITÄT, MITÄSTÖ, AINE, AINESTÖ, DESCRIPTION	Piir.N:o, TAKO CODE	KPL. QTY
YLEISTOLERANSSITOLERANCES	LUTITTY NÄXT ASSY MSDU 5175	SUUNN. DISEIGNED 2006 08 MTL 2006 08 MTL	PiirT. DRAWN 2006 08 MTL 2006 08 MTL
		TARK. CHECKED	HW. APPROVED
		TUOTE PRODUCT Metor 300 EMD	
		OSÄLAINO PART LIST 8100 886-40	REV. 01
		Piir.N:o CODE 9100 643-4LE	

REV.	MUUTOKSET REVISIONS	PVM DATE	PiirT. DRAWN	HW. APPR.



**MCDS 5190 Control and Display Set**



## SINGLE LEVEL

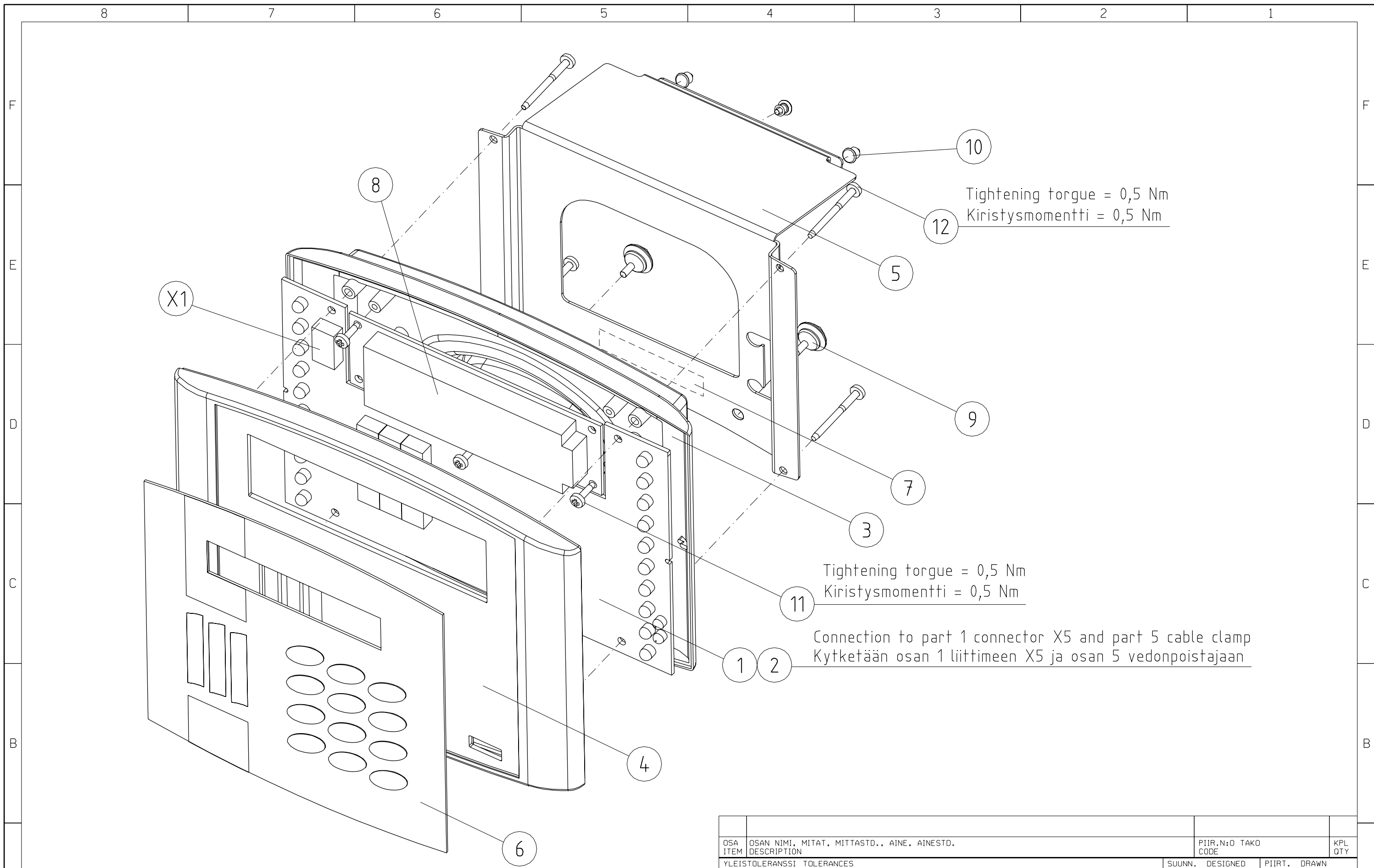
Last.revision: 01  
Revision updated: 28.6.2006  
Version: PLANNING  
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8101018	4OE	MCDS 5190 M300 EMD CONTROL AND DISPLAY SET	1,000	KPL		01
1	10	8100669	4OE MDPU 5128 M300 DISPLAY UNIT *1	1,000	KPL		07
1	20	8100927	4OE DISPLAY CABLE M300 EMD *2	1,000	KPL		03
1	30	8100681	3ME BACK COVER MCDS 5129 M300 *3	1,000	KPL		01
1	40	8100682	3ME FRONT COVER MCDS 5129 M300 *4	1,000	KPL		01
1	50	8100680	3ME BACK PLATE MCDS 5129 M300 *5	1,000	KPL		03
1	60	8100675	3XE MEMBRANE KEYBOARD MCDS 5129 *6	1,000	KPL		06
1	65	8100828	4PE RAPISCAN SYSTEMS TEXT LABEL L=45 *6	1,000	KPL	O1	02
1	70	8100631	4PE S/N LABEL BASE 14x76 *7	1,000	KPL		A
1	80	3061542	LCD-DISPLY 2x20 CHAR OPTREX C-51505NFQJ-LW-AD *8	1,000	KPL		
1	90	3061224	RUBBER PAD KORJA-KUMI 2011115 *9	2,000	KPL		
1	100	3061551	CONNECTOR TSW-108-25-L-D-RA MALE SAMTEC or 147A-15-10-016-60 WEITRONIC *X1	1,000	KPL		
1	110	3060250	SNAP RIVET 3MM SR-3035 BK PA-PLASTIC *10	3,000	KPL		
1	150	3061548	THERMOPLASTICS SCREW TP WN 1412 3X10 ZN *11	3,000	KPL		
1	160	3061549	THERMOPLASTICS SCREW TP WN 1412 3X30 ZN *12	4,000	KPL		

Related Drawings

SINGLE LEVEL

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8101018	40E	MCDS 5190 M300 EMD CONTROL AND DISPLAY SET	1,000	KPL		01
9001	9100483	3KE	CONTROL AND DISPLAY SET MCDS 5129 M300	0,000	KPL		02
9002	9100502	4XE	INSPECTION OF DELIVERY, COVERS FOR MCDS M300	0,000	KPL		1.10
9003	9100525	4VE	OPERATIONAL DESCRIPTION MCDS 5129, MDPS 5142 M300	0,000	KPL		1.10



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 05 MVU	PIIRT. DRAWN 2004 05 IJ
SUHDE SCALE 1:1.5		TARK. CHECKED	HYV. APPROVED
LIITTYY NEXT ASSY Metor 300		TUOTE PRODUCT Metor 300	
Rapiscan® systems		OSAL.N:O PART LIST 8100 673-40	REV. 02
MCDS 5129 Control and display set		PIIR.N:O CODE 9100 483-3KE	

Author J Niemi	Rev. 1.10	Code 9100 525-4VE
Approved ORA	Date 12.9.2007	Document
Product Metor 300	Archives Metor 300	
Title <b>OPERATIONAL DESCRIPTION MCDS 5129, 5190, MDPS 5142, 5191</b>		

**CONTROL AND DISPLAY UNIT, MCDS 5129, 5190  
 DISPLAY UNIT, MDPS 5142, 5191**

**1 GENERAL**

The MCDS consists of a microcontroller, a membrane keyboard, an EEPROM memory, a bi-directional infrared (IrDA) port, 2x20 character Liquid Crystal Display (LCD), a buzzer, red, green and yellow lamp.

The MDPS differs from the MCDS only by not having the membrane keyboard. MCDS 5129/5190 differ by having different cable.

**2 DISASSEMBLY**

- Disconnect the Display Cable from the unit
- Remove the four panhead screws (Phillips #1) from the back of the unit
- Lift the front plate carefully and remove the keyboard cable from the PCB (release the connector locking latch using fingernail or a small screwdriver)
- Note the display module connector position as the socket may have free pins on either end depending on the model of the display
- Remove the two panhead screws holding the display module in place
- Lift carefully and withdraw the display module from its connector
- Remove the panhead screw holding the PCB in place
- Remove the PCB

**3 OPERATIONAL DESCRIPTION**

**3.1 Serial Port**

The MCDS is connected to MELS via an ESD protected RS232 serial port. Also +12V power is fed to unit from the same connector. The transmission speed is 9600/38400 baud.

**3.2 Display Module**

The Display Unit is equipped with a 2 rows by 20 characters alphanumeric LCD module. This module is connected to microcontroller by an eight bit parallel bus. The display requires only 5V power supply.

### 3.3 Keyboard

The Display Unit has a optional membrane keyboard. This keyboard is connected as a four by four matrix: four output lines and four input lines. Each output line is pulsed one at a time and if a key is pressed, respective input line receives the pulse.

### 3.4 Buzzer

The buzzer is controlled by a full bridge transistor driver. The tone i.e. frequency is fed directly to the driver from the microcontroller. The volume is controlled by adjusting the bridge driver supply voltage.

### 3.5 Infrared Port

Communication between the MRCS and MCDS is done via an infrared port (IrDA). This port consists of a IrDA controller and transmitter/receiver circuit. Four extra infrared LEDs boost the transmitted signal to increase the operating distance to several meters. The transmission speed is 9600baud.

### 3.6 EEPROM Memory

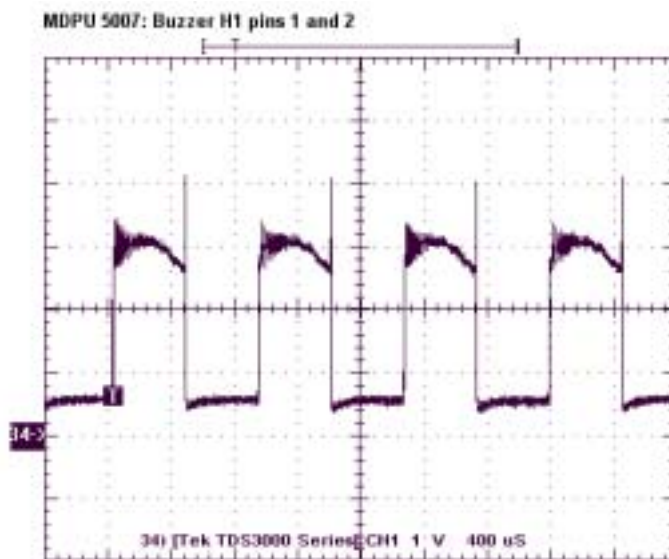
The display unit has 2-4 EEPROM serial memory chips. One contains the operational parameters (gate sensitivity etc.). The other contains English user interface menu texts. The third and fourth are reserved for localized user interface languages.

## 4 TEST POINT SIGNALS

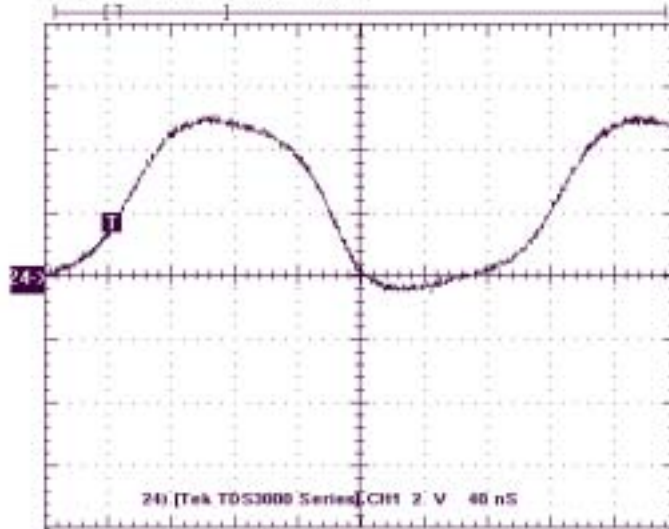
In the following table is listed DC-voltages at relevant testpoints:

Testpoint	Low limit	Nominal Voltage	High Limit
+5V	4.5V	5.0V	5.5V
+12V	10V	11.5	13V

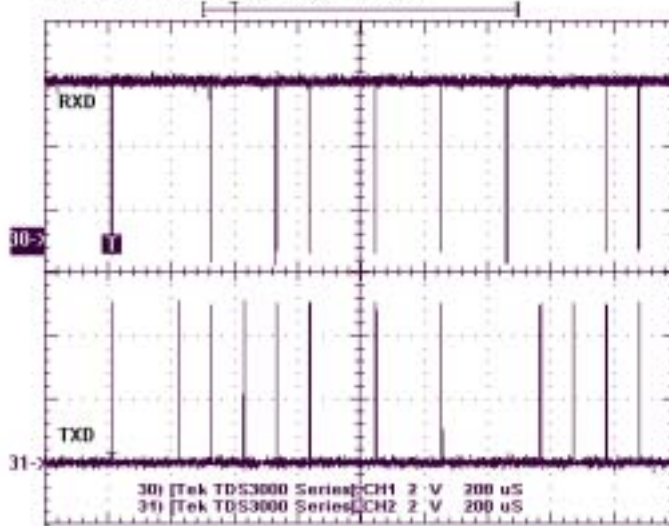
Next pictures show typical waveforms on some points:



MDPU 5007: 3.6MHz clock (IC pin 50)



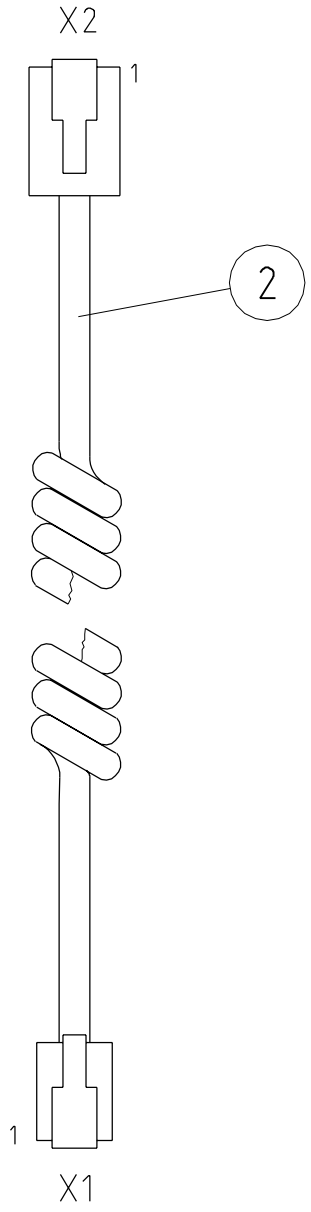
MDPU 5007: Testpoints IR\_RXD and IR\_TXD



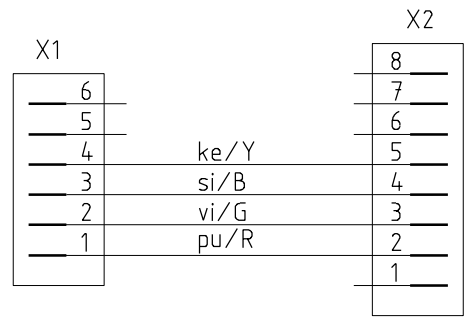
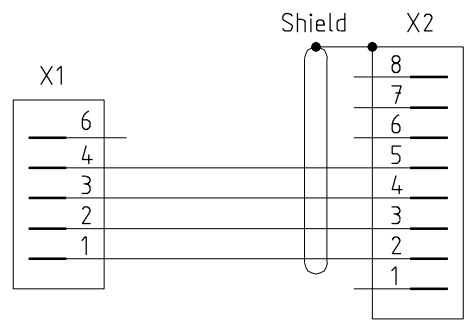
MDPU 5007: I2C clock and data during menu scroll (IC5 pins 6 and 5)



4		3		2		1	
REV.	MUUTOKSET REVISIONS	PVM DATE			PIIRT. DRAWN	HYV. APPR.	
04	Shield connected X2	2007 10			IJ	ORA	



Connection with Shielded cable



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION			PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES				SUUNN. DESIGNED 2005 11 JN1	PIIRT. DRAWN 2005 11 IJ
	SUHDE SCALE 1:1	LIITTY NEXT ASSY MCDS 5129		TARK. CHECKED 2007 11 JN1	HYV. APPROVED 2007 11 ORA
				TUOTE PRODUCT Metor 300 EMD	
OSAL.N:O PART LIST 8100 927-40				REV. 04	
Display cable			PIIR.N:O CODE 9100 585-4KE		

**MDPS 5191 Display Set**



## SINGLE LEVEL

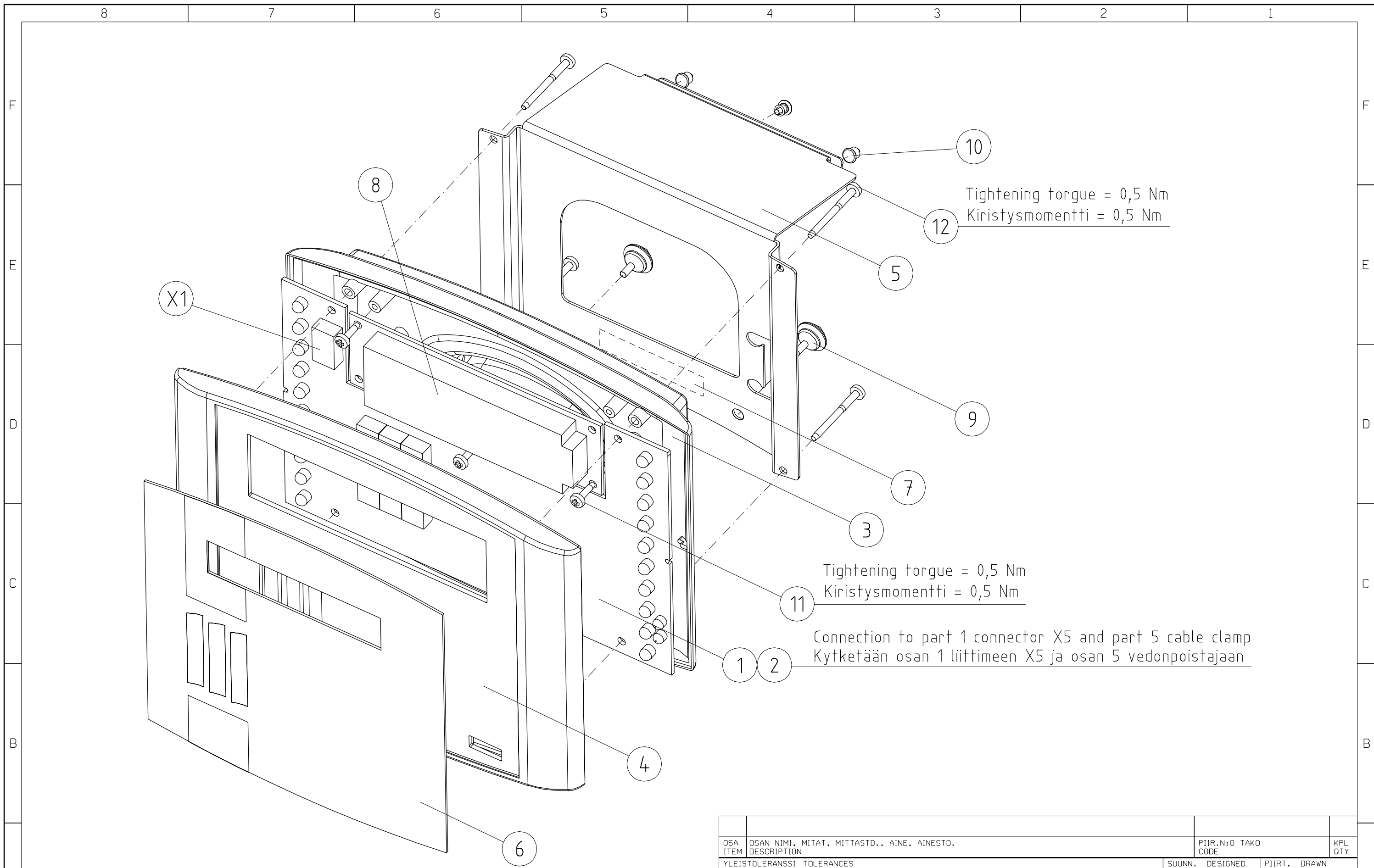
Last.revision: 01  
Revision updated: 29.6.2006  
Version: PLANNING  
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8101022	4OE	MDPS 5191 M300 EMD DISPLAY SET	1,000	KPL		01
1	10	8100669	4OE MDPU 5128 M300 DISPLAY UNIT *1	1,000	KPL		07
1	20	8100927	4OE DISPLAY CABLE M300 EMD *2	1,000	KPL		03
1	30	8100681	3ME BACK COVER MCDS 5129 M300 *3	1,000	KPL		01
1	40	8100682	3ME FRONT COVER MCDS 5129 M300 *4	1,000	KPL		01
1	50	8100680	3ME BACK PLATE MCDS 5129 M300 *5	1,000	KPL		03
1	60	8100765	3XE DISPLAY DIAPHGRAM MDPS 5142 *6	1,000	KPL		03
1	65	8100828	4PE RAPISCAN SYSTEMS TEXT LABEL L=45 *6	1,000	KPL	O1	02
1	70	8100631	4PE S/N LABEL BASE 14x76 *7	1,000	KPL		A
1	80	3061542	LCD-DISPLY 2x20 CHAR OPTREX C-51505NFQJ-LW-AD *8	1,000	KPL		
1	90	3061224	RUBBER PAD KORJA-KUMI 2011115 *9	2,000	KPL		
1	100	3061551	CONNECTOR TSW-108-25-L-D-RA MALE SAMTEC or 147A-15-10-016-60 WEITRONIC *X1	1,000	KPL		
1	110	3060250	SNAP RIVET 3MM SR-3035 BK PA-PLASTIC *10	3,000	KPL		
1	150	3061548	THERMOPLASTICS SCREW TP WN 1412 3X10 ZN *11	3,000	KPL		
1	160	3061549	THERMOPLASTICS SCREW TP WN 1412 3X30 ZN *12	4,000	KPL		

Related Drawings

SINGLE LEVEL

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L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
-----							
	8101022	4OE	MDPS 5191 M300 EMD DISPLAY SET	1,000	KPL		01
9001	9100528	3KE	DISPLAY SET MDPS 5142 M300	0,000	KPL		01
9002	9100502	4XE	INSPECTION OF DELIVERY, COVERS FOR MCDS M300	0,000	KPL		1.10
9003	9100525	4VE	OPERATIONAL DESCRIPTION MCDS 5129, MDPS 5142 M300	0,000	KPL		1.10



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 05 MVU	PIIRT. DRAWN 2004 05 IJ
SUHDE SCALE 1:1.5		TARK. CHECKED	HYV. APPROVED
LIITTYY NEXT ASSY Metor 300		TUOTE PRODUCT Metor 300	
<b>Rapiscan®</b> systems		OSAL.N:O PART LIST 8100 717-40	REV. 01
MDPS 5142 Display set		PIIR.N:O CODE 9100 528-3KE	

**MTLS 5169 Traffic Light Set**

## SINGLE LEVEL

Last.revision: 01

Revision updated: 28.12.2004

Version: PLANNING

Accept:

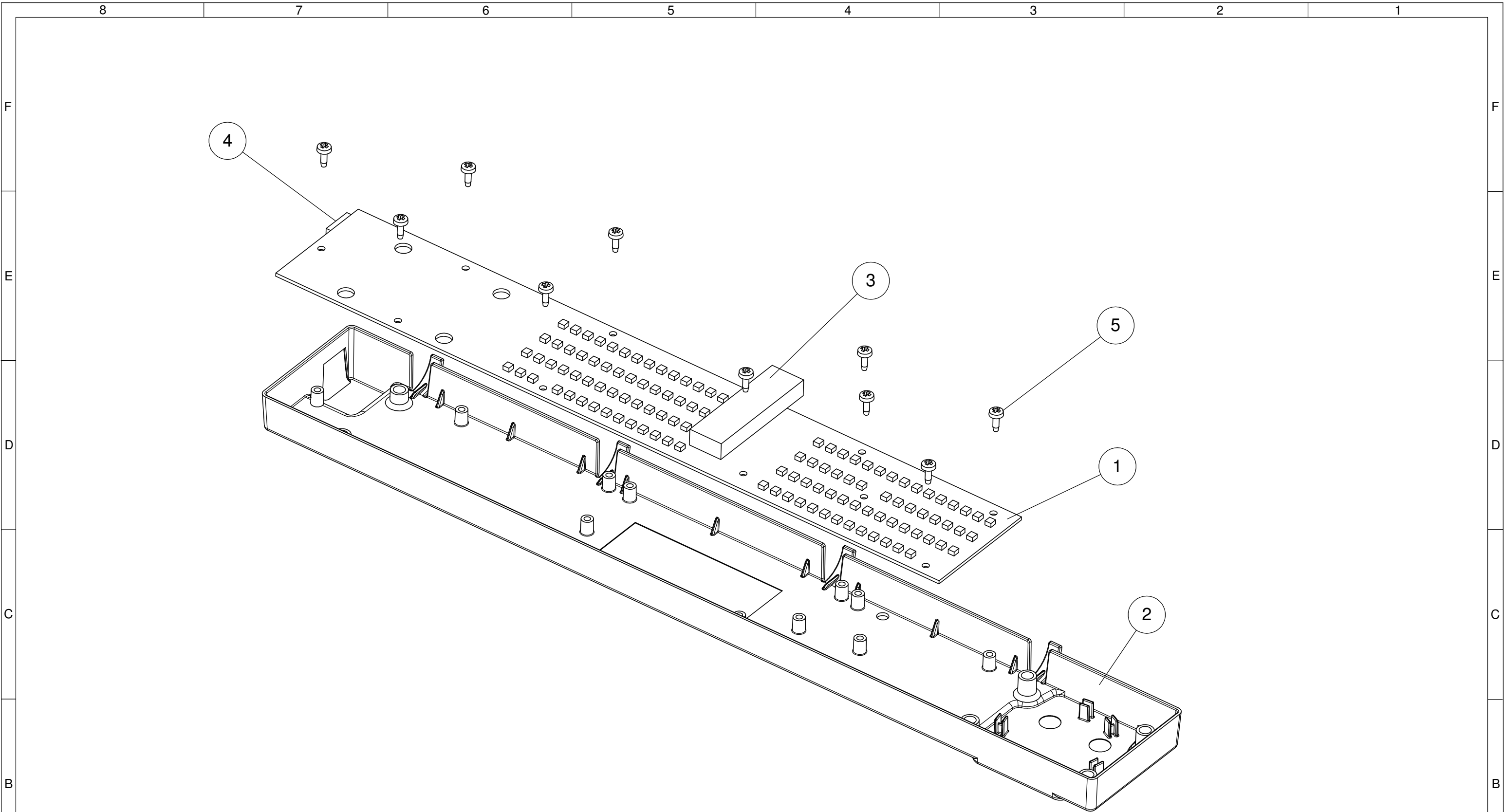
L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100774	4OE	MTLS 5169 M300 P, EMD TRAFFIC LIGHT SET	1,000	KPL		01
1	10	8100775	4OE MTLU 5151 M300 P, EMD TRAFFIC LIGHT UNIT *1	1,000	KPL		03
1	20	8100833	3ME BACK COVER M300 P, EMD *2	1,000	KPL		005
1	30	3025939	SEALING TAPE FLEXOPAD W 8X15 *3	0,056	M		
1	40	3061721	ETHERNET CABLE CAT-5 RJ45 0.5m UTP GREY OR BEIGE *4	1,000	KPL		
1	50	3061712	THERMOPLASTICS SCREW TP WN 1412 3x8 ZN *5	10,000	KPL		

## Related Installation components

8000	1520253		COUNTERSUNK FLAT HEAD SCREW UK M4x16-8.8-Z-FE/AlJ I	6,000	KPL		
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## Related Drawings

9001	9100648	3KE	TRAFFIC LIGHT SET MTL5 5169 M300 P, EMD	0,000	KPL		003
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YLEISTOLERANSSIT / TOLERANCES STANDARDIT / STANDARDS		AINE / MATERIAL / STANDARDI / STANDARD /		SUUNN. / DESIGNED / PVM DATE <b>MVu / 29.6.2006</b>	
		PINTAKÄSITTELY / SURFACE TREATMENT /		TARK. / CHECKED / PVM DATE /	
SUHDE / SCALE <b>1:1.5</b>		VÄRI / COLOR /		TUOTE / PRODUCT <b>Metor</b>	
MASSA / MASS <b>0.11 Kg</b>		<b>MTLS 5169</b>		HYV. / APPROVED / PVM DATE /	
				3D-TIEDOSTO LIITTYY / 3D-FILE APPENDIX <input type="checkbox"/>	
				TARKASTUSOHJE LIITTYY / QUALITY CONTROL APPENDIX <input type="checkbox"/>	
				PIIR.NRO. / DWG.NO <b>9100648</b>	
				REV. <b>003</b>	

**MRCS 5116 Remote Control Set**

## SINGLE LEVEL

Last.revision: 06

Revision updated: 8.3.2005

Version: PLANNING

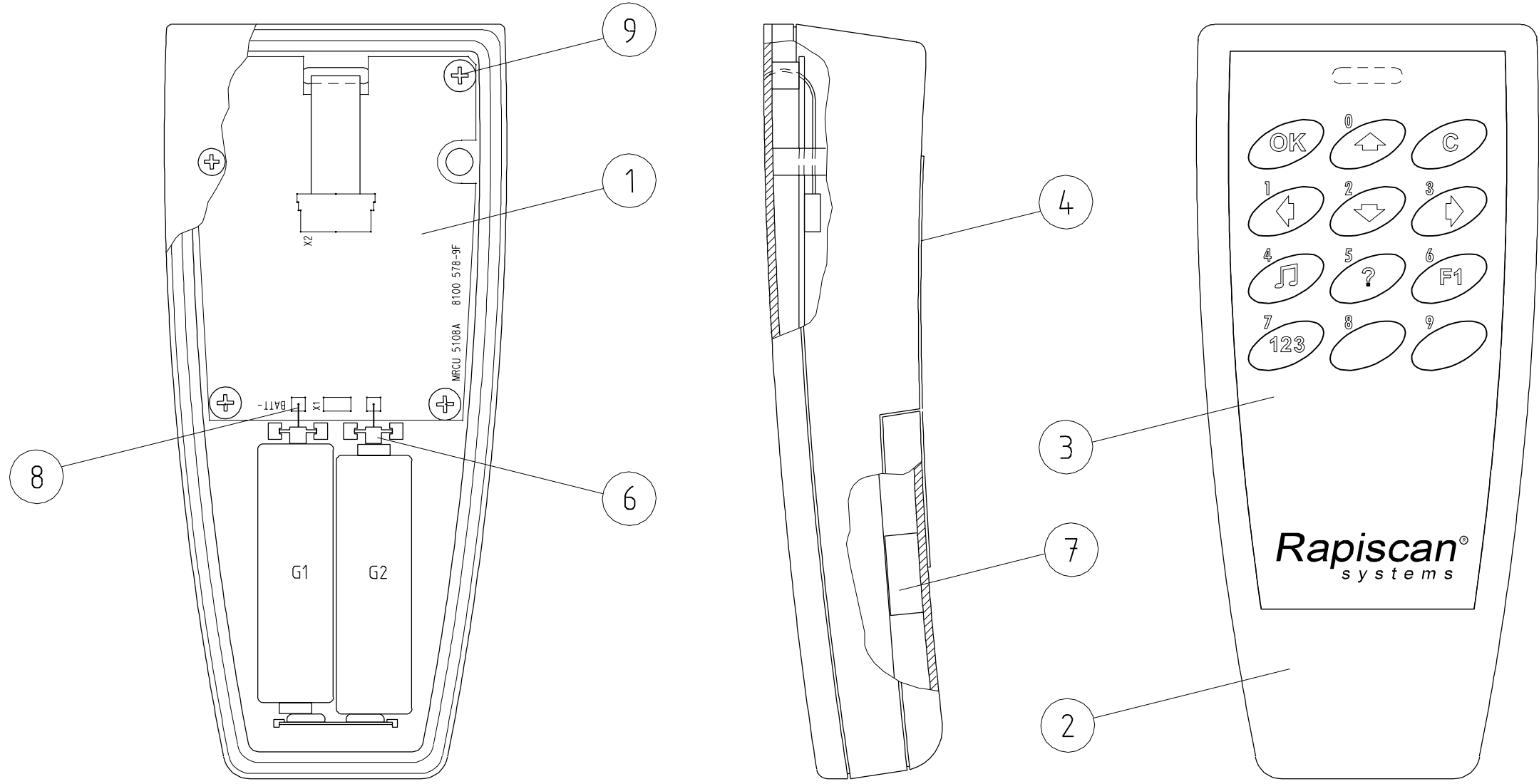
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100577	40	MRCS 5116 M300 REMOTE CONTROL SET	1,000	KPL		06
1	10	8100612	4OE MRCU 5108 M300 REMOTE CONTROL UNIT *1	1,000	KPL		03
1	20	8100579	4M MRCS 5116 BOX HOLE M300 *2	1,000	KPL		01
1	30	8100580	3XE MEMBRANE KEYBOARD MRCS 5116 M300 *3	1,000	KPL		05
1	35	8100827	4PE RAPISCAN SYSTEMS TEXT LABEL L=38	1,000	KPL	O1	01
1	40	8100631	4PE S/N LABEL BASE 14x76 *4	1,000	KPL		A
1	60	3061430	BATTERY CLIPS FOR OKW SMART CASE A91 90 002 *6	1,000	KPL		
1	70	3059881	ALKALINE CELL 1,5V AA 2300MAH TYPE 4006 D14,5xH50 *G1,2	2,000	KPL		
1	80	3025939	SEALING TAPE FLEXOPAD W 8X15 *7	0,020	M		
1	90	1496322	WIRE KJ 1X0,15mm2 THINNED BK *8	0,020	M		
1	150	3061329	TAPPING SCREW KK ST2,9x6.5-C-PZ-AISI 304 DIN 7981 *9	4,000	KPL		

## Related Drawings

9001	9100366	3KE	REMOTE CONTROL SET MRCS 5116 M300	0,000	KPL		04
9002	9100426	4XE	TEST SPESIFICATION MRCS 5115, 5116 M300	0,000	KPL		1.00
9003	9100412	4VE	OPERATIONAL DESCRIPTION MRCS 5115, 5116 M300	0,000	KPL		1.10





REV.	MUUTOKSET	REVISIONS	PVM	DATE	PIIRT.	DRAWN	HYV.	APPR.
04	Logo muutettu / Logo changed		2005	02	IJ		ORA	

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2002 10 JNI	PIIRT. DRAWN 2002 10 IJ
SUHDE SCALE LIITTYY NEXT ASSY Metor 300		TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA
TUOTE PRODUCT Metor 300		OSAL.N:O PART LIST 8100 577-40	
		REV. 04	
MRCS 5116 Remote control set		PIIR.N:O CODE 9100 366-3KE	

Author J Niemi	Rev. 1.10	Code 9100 412-4VE
Approved ORA	Date 19.11.2004	Document
Product METOR 300		Archives METOR 300
Title <b>OPERATIONAL DESCRIPTION MRCS 5115, 5116</b>		

## REMOTE CONTROL UNIT, MRCS 5115, 5116

### 1 GENERAL

The MRCS consist of a microcontroller, membrane keyboard, EEPROM memory, bi-directional infrared (IrDA) port, two 1.5V AA alkaline batteries, a battery voltage monitor and a charge pump.

The MRCS 5115 and 5116 are otherwise identical except that the MRCS 5115 case is smaller and holds two AAA instead of AA size batteries.

### 2 OPERATIONAL DESCRIPTION

When not in use the remote control unit is in sleep mode and consumes only approximately 30 $\mu$ A current from the batteries. When a key is pressed the microcontroller wakes up, powers the rest of the electronics, and sends the encrypted keymap frame to the Display Unit. After that the MRCU waits for one minute for a command from the Display Unit (parameter copy etc.) and then falls back to sleep. During the sleep mode, the infrared controller and battery voltage monitor is powered down to conserve power.

An EEPROM memory is used to store the information received from the infrared port.

A charge pump regulator supplies the circuitry with regulated +5V power.

Two extra infrared LEDs boost the transmitted signal to increase the operating distance to several meters.

### 3 SELF DIAGNOSIS

The MRCS is equipped with a two level battery voltage monitor. This circuit signals the microcontroller when the battery voltage is below 2.5V. This will issue "REMOTE CONTROL BATTERY LOW" warning on MCDS. The MRCS is still functional.

When battery voltage drops below approximately 2V, the charge pump regulator cannot anymore supply the 5V operating voltage. The battery voltage monitor signals this to the microcontroller. This issues "REPLACE REMOTE CONTROL BATTERY" error on MCDS. The MRCS is not functional anymore; it only sends empty keymap and error code to the MCDS and goes immediately to sleep.

**NOTE:** Using NiCd or NiMH rechargeable batteries will cause premature “Battery low” –warning, as these have typical cell voltage of 1.2V instead of 1.5V.

#### 4 TEST POINT SIGNALS

In the following table is listed DC-voltages at relevant testpoints:

Testpoint	Low limit	Nominal Voltage	High Limit
B+5V (IC5/1) (awake)	4.5V	5.0V	5.5V
B+5V (IC5/1) (sleep)		0V	
BATT+	2.0V	3.0V	4.0V
D+5V (IC6/3)	4.5V	5.0V	5.5V

**MTRS 5177 TX/RX Coil Panel Set**

SINGLE LEVEL

Last.revision: 01

Revision updated: 9.9.2005

Version: PLANNING

Accept:

8100888 40E MTRS 5177 M300 EMD TX/RX COIL PANEL SET

1,000 KPL

01

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100889 40E	MTXS 5178 TRANSMITTER PANEL SET M300 EMD	1,000	KPL		05
1	20	8100890 40E	MRXS 5179 RECEIVER PANEL SET M300 EMD	1,000	KPL		06
1	30	8100621 40E	COIL PACKING M300 2300x800x220	1,000	KPL		02

**MTXS 5178 Transmitter Panel Set**

SINGLE LEVEL

Last.revision: 06  
 Revision updated: 28.10.2008  
 Version: PLANNING  
 Accept:

8100889 MTXS 5178 TRANSMITTER PANEL SET M300 EMD				1,000 KPL
L. Line	Item	Dty	Description	Qty U/M Feat.
1	10		MTXU 5221 Transmitter Unit *1	1,000 KPL
1	20	8100893 4OE	MZDS 5182 ZONE DISPLAY SET M300 EMD *2	1,000 KPL
1	30	8100755 4OE	TRAFFIC COUNTER SET 1700mm M300v.3, EMD *3	2,000 KPL
1	50	8100901 3ME	COIL FRAME M300 EMD *5	1,000 kpl
1	60	8101019 4OE	TX COIL M300 EMD *6	1,000 KPL
1	70	8100739 4OE	POWER CORD DOOR MTXS, MRXS M300 v.3 *7	1,000 KPL
1	75	4100343 4OE	POWER CABLE 3M	1,000 KPL
1	80	8100740 3ME	HAT M300 v.3 *8	1,000 KPL
1	90	8100741 3ME	BOOT M300 v.3 *9	1,000 KPL
1	100	8100742 3ME	LIGHT TUBE FOR ZONE DISPLAY M300 v.3 T40510-2/252 SMOKE GRE *10	2,000 KPL
1	110	8100743 3ME	MOUNTING PROFILE ZONE DISPLAY M300 T40510-1/GR v.3 *11	2,000 KPL
1	115	8101084 4PE	TYPE STICKER 20x40 MTXS M300 EMD *23	1,000 KPL
1	120	8100631 4PE	S/N LABEL BASE 14x76 *12	2,000 KPL
1	125	8100756 4ME	ANTI-SKID WASHER 25x6x8 *18	2,000 KPL
1	130	8101035 3ME	BOOT SHIELD M300 EMD *22	1,000 KPL
1	135	8101080 3ME	COIL BED WEDGE M300 *24	4,000 KPL

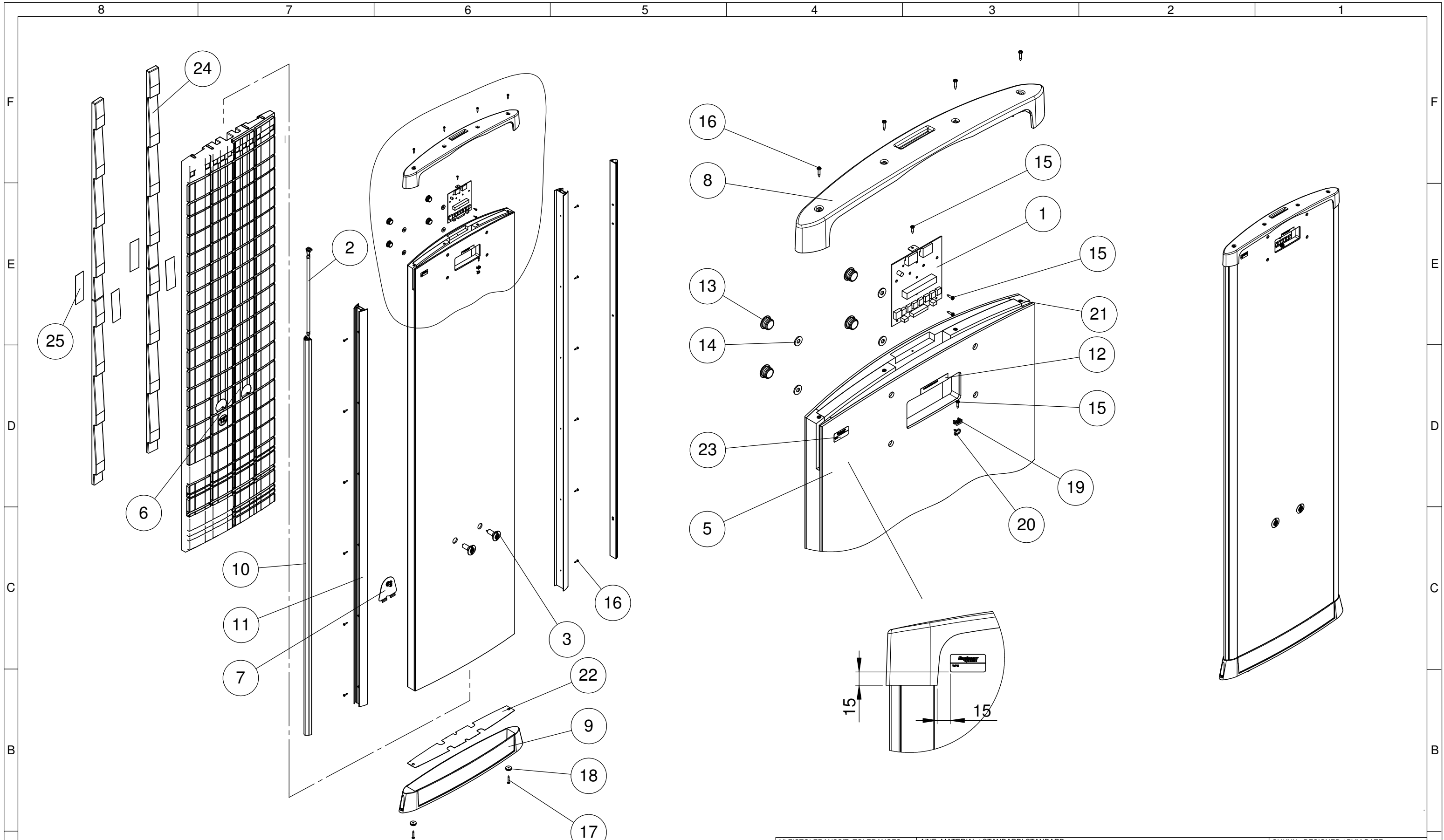
SINGLE LEVEL

L. Line	Item	Dty	Description	Qty	U/M	Feat.
	8100889		MTXS 5178 TRANSMITTER PANEL SET M300 EMD	1,000	KPL	
1	140	2130177	CABLE TIE ANCHOR TM2S8 *19	1,000	KPL	
1	150	2130128	CABLE TIE SST2S 4,6X172MM *20	1,000	KPL	
1	155	3061764	DUCT TAPE 50MM *25 (60cm)	0,060	RLI	
1	160	3061389	BUSHING BLACK RK-22 ETOLA *13	4,000	KPL	
1	170	3061414	WASHER M8/8.4/20/2 ST Zn SFS373 BOSSARD *14	4,000	KPL	
1	180	3061597	UNIVERSAL SCREW CH 3,5x15 Zn *15	3,000	KPL	
1	190	3061601	UNIVERSAL SCREW CH 4x20 ZN PZ *16	17,000	KPL	
1	200	3061598	UNIVERSAL SCREW CH 5x35 A2 *17	2,000	KPL	
1	210	3061602	CONE PLUG 8 MM / FOR WOOD *21	4,000	KPL	

Related Drawings

9001	9100602	3KE	TRANSMITTER PANEL SET MTXS 5178 M300 EMD	0,000	KPL	
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Revision	Description	Date
006	Part numbers 24 and 25 added.	20.2.2007
005	Sticker added. Dimensions for sticker position added.	15.12.2006

YLEISTOLERANSSIT / TOLERANCES STANDARDIT / STANDARDS		AINE / MATERIAL / STANDARDI / STANDARD /		SUUNN. / DESIGNED / PVM DATE MVu / 27.6.2006	
		PINTAKÄSITTELY / SURFACE TREATMENT /		TARK. / CHECKED / PVM DATE /	
SUHDE / SCALE 1:15		VÄRI / COLOR A3		TUOTE / PRODUCT Metor	
MASSA / MASS 21.66 Kg		MTXS 5178 TRANSMITTER PANEL SET M300 EMD		HYV. / APPROVED / PVM DATE /	
				3D-TIEDOSTO LIITTYY / 3D-FILE APPENDIX <input type="checkbox"/>	
				TARKASTUSOHJE LIITTYY / QUALITY CONTROL APPENDIX <input type="checkbox"/>	
		PIIR.NRO. / DWG.NO 9100602		REV. 006	

Author M. Loikkanen	Rev. 1.01	Code 9100 649-4VE
Approved	Date 28.10.2008	Document
Product Metor 300 EMD		Archives M300 EMD
Title <b>OPERATIONAL DESCRIPTION MTXU 5180, 5221</b>		

## TRANSMITTER SIDE COIL ADAPTER UNIT, MTXU 5180, 5221

### 1 GENERAL

The MTXU consists of coil adapter components (capacitors and transformers), switches for enabling zone displays and connectors for: TX coil cable (Centronics), transmitter coils, photocells (traffic counters), zone displays, electric shield and MTXU-MRXU cable (RJ45).

### 2 OPERATIONAL DESCRIPTION

Each transmitter channel has capacitor(s) to create a resonance circuit with the coil. There are transformers connected between transmitter coils and between transmitter and receiver coils (through the MTXU-MRXU cable). The transformers minimize mutual inductance between the channels.

Two photoelectric sensors can be connected to the MTXU for passenger counting. Only NPN output types can be used. The output is low when the gate is empty.

Two enable signals from the MCCU switch on or off regulators that power the zone displays.

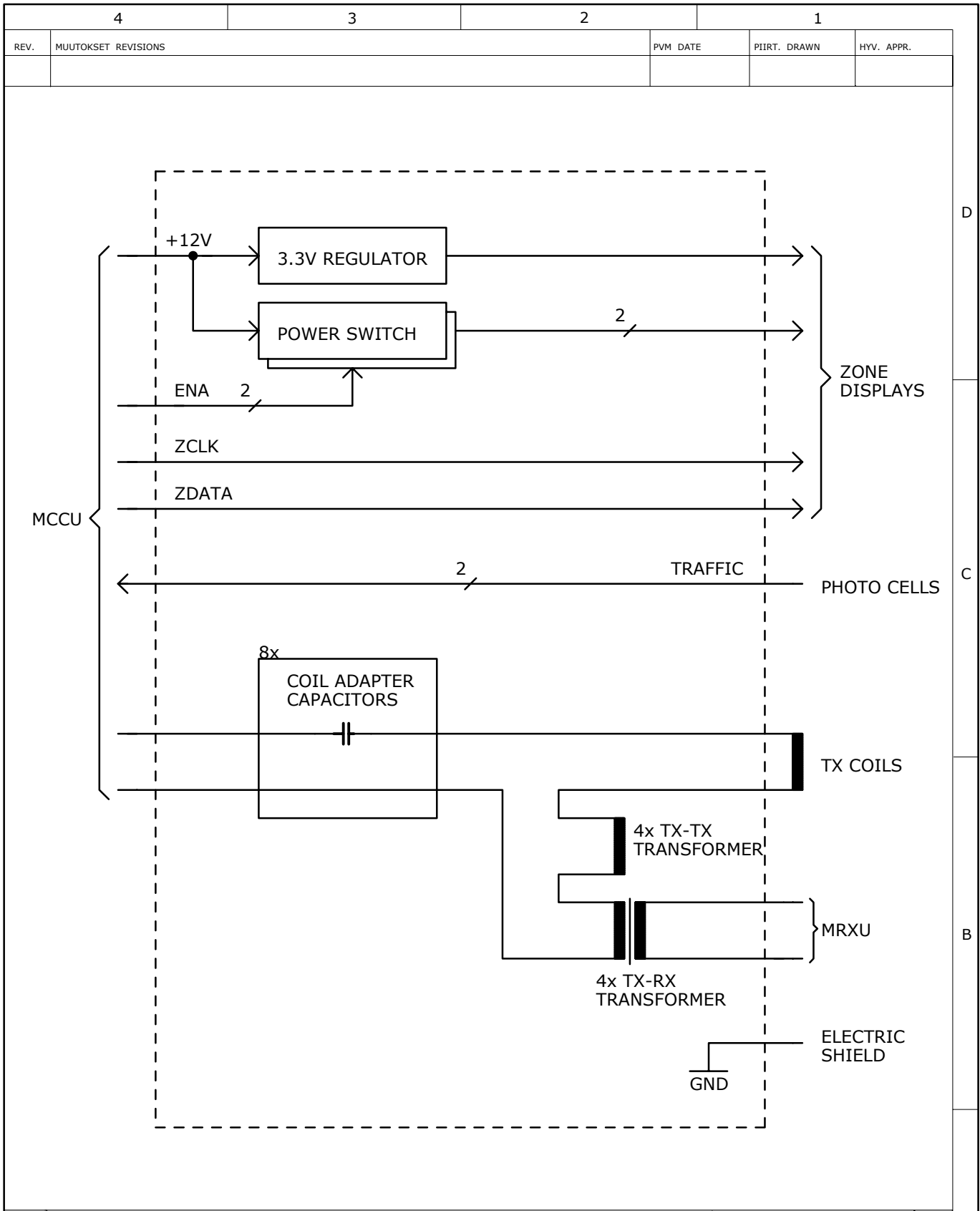
### 3 REVISION HISTORY


Rev. 1.01, 28.10.2008

- Added MTXU 5221 / TV.

Rev. 1.00, 26.09.2006

- Accepted in production 11.05.2007 ORA.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2006 08 MTL	PIIRT. DRAWN 2006 08 MTL
SUHDE SCALE	LIITTY NEXT ASSY MTXU 5180	TARK. CHECKED	HYV. APPROVED
	<b>MTXU 5180</b> Block Diagram	TUOTE PRODUCT <b>Metr 300 EMD</b>	
		OSAL.N:O PART LIST <b>8100 891-40</b>	REV. <b>01</b>
		PIIR.N:O CODE <b>9100 646-4LE</b>	

## SINGLE LEVEL

Last.revision: 01

Revision updated: 9.9.2005

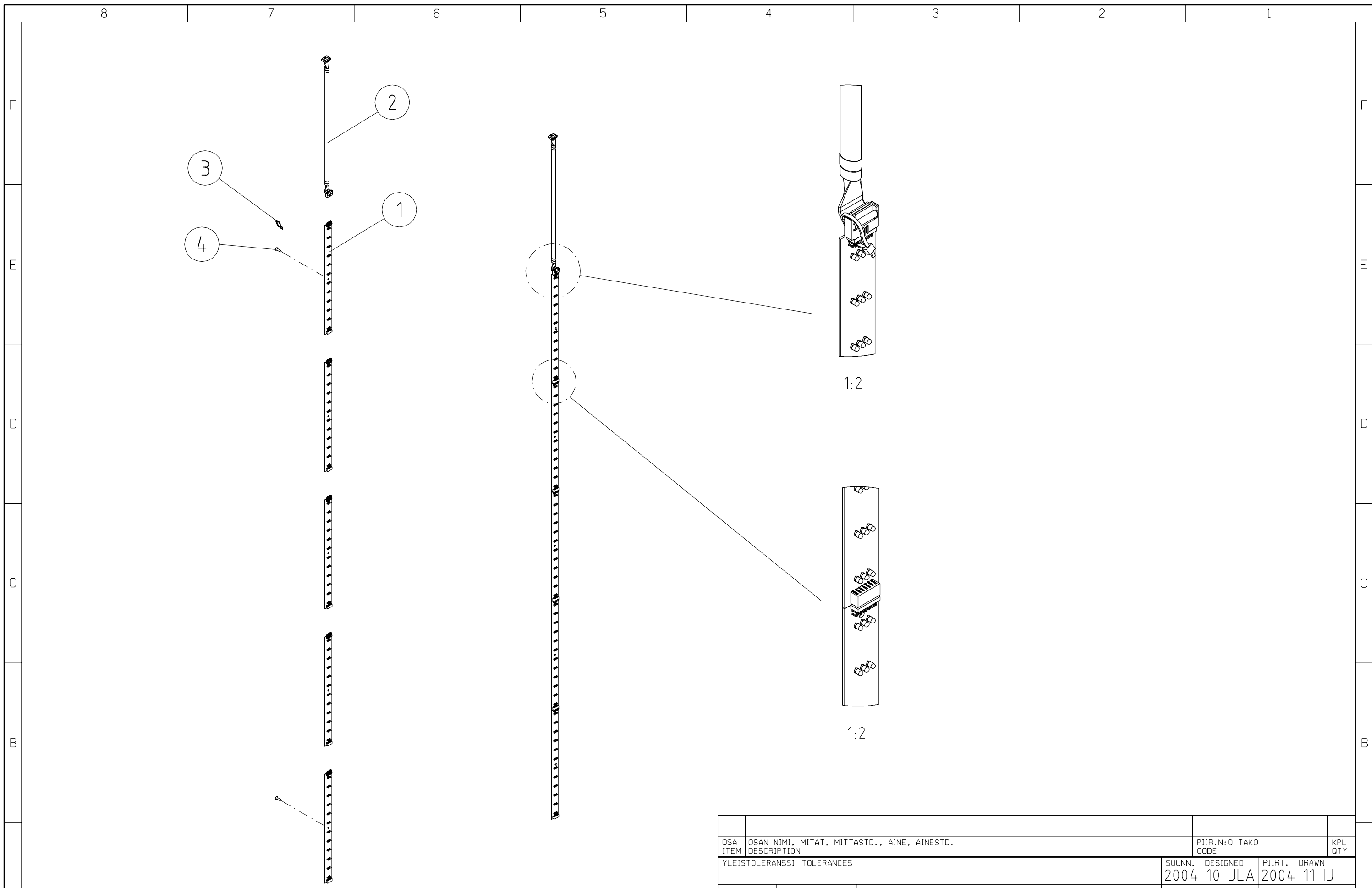
Version: PLANNING

Accept:


L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100893	4OE	MZDS 5182 ZONE DISPLAY SET M300 EMD	1,000	KPL		01
1	10	8100894	4OE MZDU 5183 ZONE DISPLAY UNIT M300 EMD *1	5,000	KPL		02
1	20	8100929	4OE ZONE DISPLAY CABLE M300 EMD *2	1,000	KPL		01
1	30	3061599	CABLE TIE PANDUIT PLT1M-M20 *3	1,000	KPL		
1	40	3061600	THIN PLATE SCREW CH 4,2x16 ZN PZ *4	2,000	KPL		

## Related Drawings

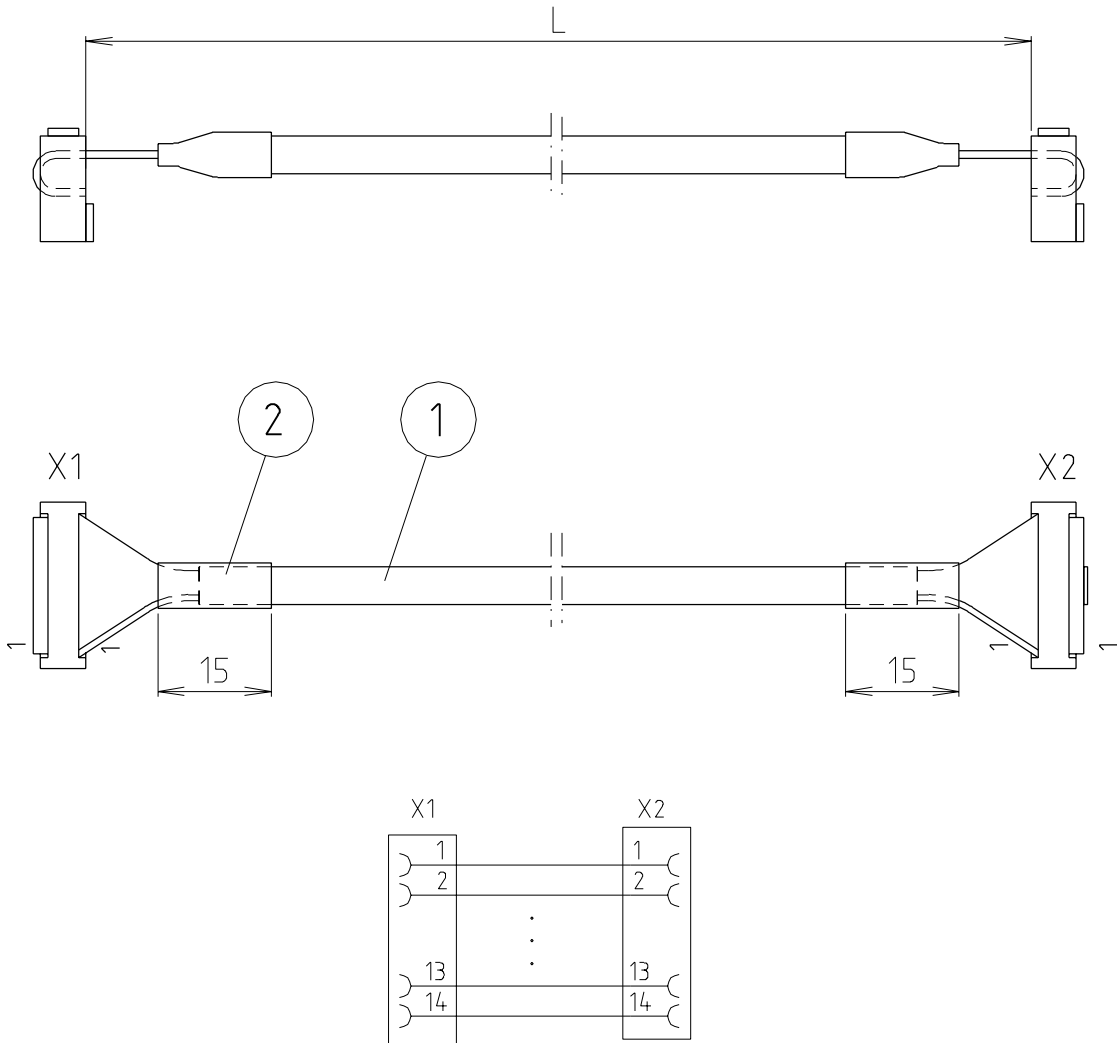
9001	9100510	3AE	ZONE DISPLAY INSTALLATION M300	0,000	KPL		01
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REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 10 JLA	PIIRT. DRAWN 2004 11 IJ
 SUHDE SCALE (1:2) 1:10	LIITTYY NEXT ASSY MTXS, MRXS	TARK. CHECKED	HYV. APPROVED
	<b>Rapiscan®</b> systems		TUOTE PRODUCT Metor 300
Zone display installation v.3		OSAL.N:O PART LIST 8100 701-40	REV. 01
		PIIR.N:O CODE 9100 510-3AE	

4		3		2		1	
REV.	MUUTOKSET REVISIONS			PVM DATE	PIIRT. DRAWN	HYV. APPR.	
02	Mitta poistettu / Delete dimension			2005 11	IJ	ORA	



OSA ITEM		OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION		PIIR.N:O TAKO CODE		KPL QTY	
YLEISTOLERANSSI TOLERANCES				SUUNN. DESIGNED 2004 11 JN1		PIIRT. DRAWN 2004 11 IJ	
SUHDE SCALE 1:1		LIITTYY NEXT ASSY MRXS, MTXS		TARK. CHECKED 2005 06 JLA		HYV. APPROVED 2005 06 ORA	
		Zone display cable		TUOTE PRODUCT Metor 300, EMD		OSAL.N:O PART LIST	
				PIIR.N:O CODE 9100 512-4KE		REV. 02	

## SINGLE LEVEL

Last.revision: 01

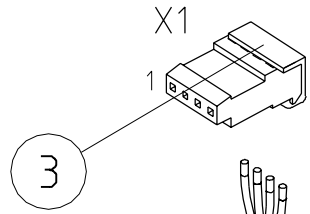
Revision updated: 1.11.2004

Version: PLANNING

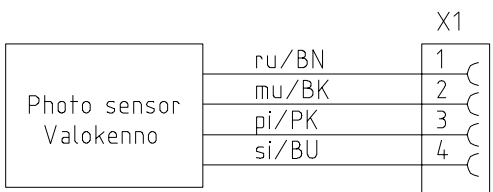
Accept:

L. Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	8100755	4OE	TRAFFIC COUNTER SET 1700mm M300v.3, EMD	1,000	KPL		01
1	10	8100556	4ME PHOTO SENSOR MOUNTING BUSHING MTXS M300 *1	1,000	KPL		02
1	20	3060251	PHOTO SENSOR SUNX CY-27 RETROREFLEX NPN LIGHT/DARK-ON or 655.4219.002 BERNSTEIN *2	1,000	KPL		
1	30	3061301	CONNECTOR 4NAP 0,3-0.4mm2 RED CE100F22-4 MAS-CON *X1	1,000	KPL		
1	40	3061388	CONNECTOR COVER EC100F-4 SNAP-ON COVER EC100F-4 MAS-CON *3	1,000	KPL		
1	50	2723294	SCREW UK ST2,9X9,5-C-Z FE/ZNA1 ISO 7050 *4	2,000	KPL		
Related Installation components							
8001	4100347	4ME	REFLECTOR DIA 70mm MTXS	1,000	KPL		B
Related Drawings							
9001	9100520	4KE	TRAFFIC COUNTER SET 1700mm v.3 M300	0,000	KPL		01
9002	9100503	4AE	INSTALLATION OF TRAFFIC COUNTER REFLECTOR M300	0,000	KPL		1.00

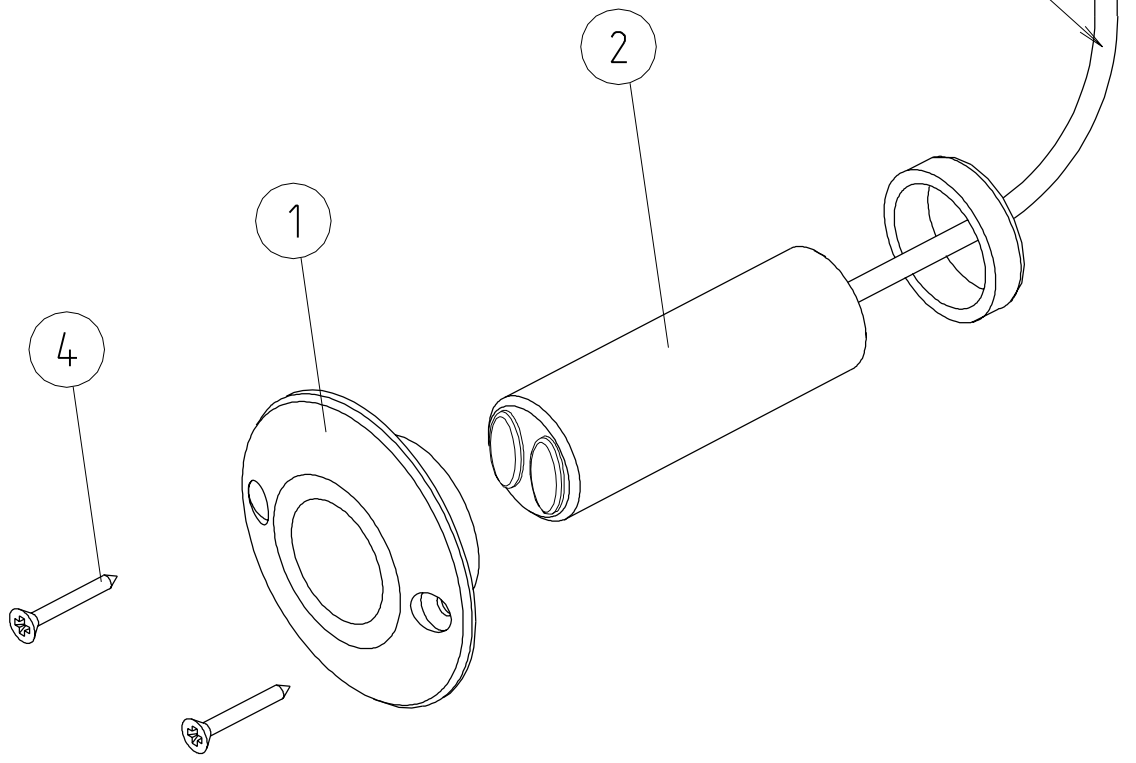
4		3		2		1		
REV.	MUUTOKSET REVISIONS					PVM DATE	PIIRT. DRAWN	HYV. APPR.



Note! X1 connection after assembly  
Huom! X1 kytkentä asennuksen jälkeen



Cable length 1700mm  
Johdon mitta 1700mm



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 11 JLA	PIIRT. DRAWN 2004 11 IJ
	SUHDE SCALE 1:1	LIITTYY NEXT ASSY MTXS 5100	TARK. CHECKED
			HYV. APPROVED
Traffic counter set 1700mm v.3		TUOTE PRODUCT Metor 300	REV. 01
		OSAL.N:O PART LIST 8100 755-40	
		PIIR.N:O CODE 9100 520-4KE	



**MRXS 5179 Receiver Panel Set**

## SINGLE LEVEL

Last.revision: 07

Revision updated: 28.10.2008

Version: PLANNING

Accept:

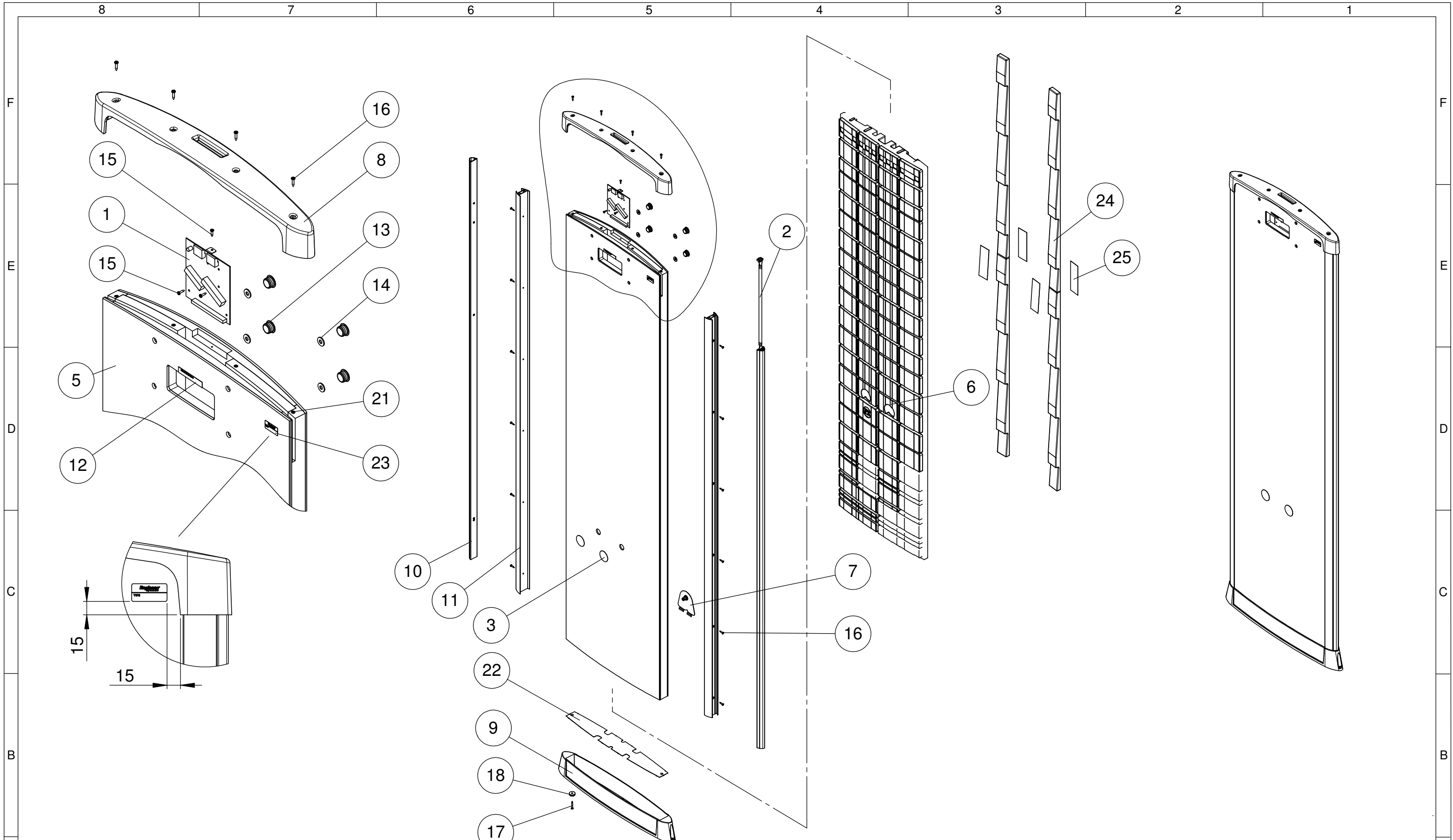
L. Line	Item	Dty	Description	Qty	U/M	Feat.
	8100890		MRXS 5179 RECEIVER PANEL SET M300 EMD	1,000	KPL	
1	10		MRXU 5222 Receiver Unit *1	1,000	KPL	
1	20	4OE	MZDS 5182 ZONE DISPLAY SET M300 EMD *2	1,000	KPL	
1	30	4ME	REFLECTOR DIA 70mm MTXS *3 (Ref. 8100 755-4OE)	0,000	KPL	
1	40	3ME	COIL FRAME M300 EMD *5	1,000	kpl	
1	50	4OE	RX COIL M300 EMD *6	1,000	KPL	
1	60	4OE	POWER CORD DOOR MTXS, MRXS M300 v.3 *7	1,000	KPL	
1	70	3ME	HAT M300 v.3 *8	1,000	KPL	
1	80	3ME	BOOT M300 v.3 *9	1,000	KPL	
1	90	3ME	LIGHT TUBE FOR ZONE DISPLAY M300 v.3 T40510-2/252 SMOKE GRE *10	2,000	KPL	
1	100	3ME	MOUNTING PROFILE ZONE DISPLAY M300 T40510-1/GR v.3 *11	2,000	KPL	
1	110	4PE	TYPE STICKER 20x40 MRXS M300 EMD *23	1,000	KPL	
1	120	4PE	S/N LABEL BASE 14x76 *12	1,000	KPL	
1	130	4ME	ANTI-SKID WASHER 25x6x8 *18	2,000	KPL	
1	140	3ME	BOOT SHIELD M300 EMD *22	1,000	KPL	
1	150	3ME	COIL BED WEDGE M300 *24	4,000	KPL	
1	155		DUCT TAPE 50MM *25 (60cm)	0,060	RLl	

## SINGLE LEVEL

8100890 MRXS 5179 RECEIVER PANEL SET M300 EMD				1,000 KPL
L. Line	Item	Dty	Description	Qty U/M Feat.
1	160	3061389	BUSHING BLACK RK-22 ETOLA *13	4,000 KPL
1	170	3061414	WASHER M8/8.4/20/2 ST Zn SFS373 BOSSARD *14	4,000 KPL
1	180	3061597	UNIVERSAL SCREW CH 3,5x15 Zn *15	3,000 KPL
1	190	3061601	UNIVERSAL SCREW CH 4x20 ZN PZ *16	17,000 KPL
1	200	3061598	UNIVERSAL SCREW CH 5x35 A2 *17	2,000 KPL
1	210	3061602	CONE PLUG 8 MM / FOR WOOD *21	4,000 KPL

## Related Drawings

9001	9100603	3KE	RECEIVER PANEL SET MRXS 5179 M300 EMD	0,000 KPL
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Revision	Description	Date
005	Part numbers 24 and 25 added.	20.2.2007
004	Sticker added. Dimensions for sticker position added.	18.12.2006

YLEISTOLERANSSIT / TOLERANCES STANDARDIT / STANDARDS	AINE / MATERIAL / STANDARDI / STANDARD /	SUUNN. / DESIGNED / PVM DATE MVu / 3.7.2006
	PINTAKÄSITTELY / SURFACE TREATMENT /	TARK. / CHECKED / PVM DATE /
SUHDE / SCALE 1:15 A3	VÄRI / COLOR	TUOTE / PRODUCT Metor
MASSA / MASS 21.60 Kg	MRXS 5179 RECEIVER PANEL SET M300 EMD	HYV. / APPROVED / PVM DATE /
		3D-TIEDOSTO LIITTYY / 3D-FILE APPENDIX <input type="checkbox"/>
		TARKASTUSOHJE LIITTYY / QUALITY CONTROL APPENDIX <input type="checkbox"/>
PIIR.NRO. / DWG.NO 9100603		REV. 005

Author M. Loikkanen	Rev. 1.01	Code 9100 653
Approved	Date 29.10.2008	Document
Product Metor 300 EMD		Archives M300 EMD
Title <b>OPERATIONAL DESCRIPTION MRXU 5181, 5222</b>		

## RECEIVER SIDE COIL ADAPTER UNIT, MRXU 5181, 5222

### 1 GENERAL

The MRXU consists of coil adapters (capacitors and resistors), mutual inductance compensation selection switches, switches for enabling zone displays and connectors for: RX coil cables (Centronics), receiver coils, zone displays, electric shield and MTXU-MRXU cable (RJ45).

### 2 OPERATIONAL DESCRIPTION

The coil adapters create a balanced low-pass RC filter.

There are switches controlled by two signals from the MCCU that set the proper scaling factor for TX-RX mutual inductance compensation (depends on the cross piece width).

Two enable signals from the MCCU switch on or off regulators that power the zone displays.

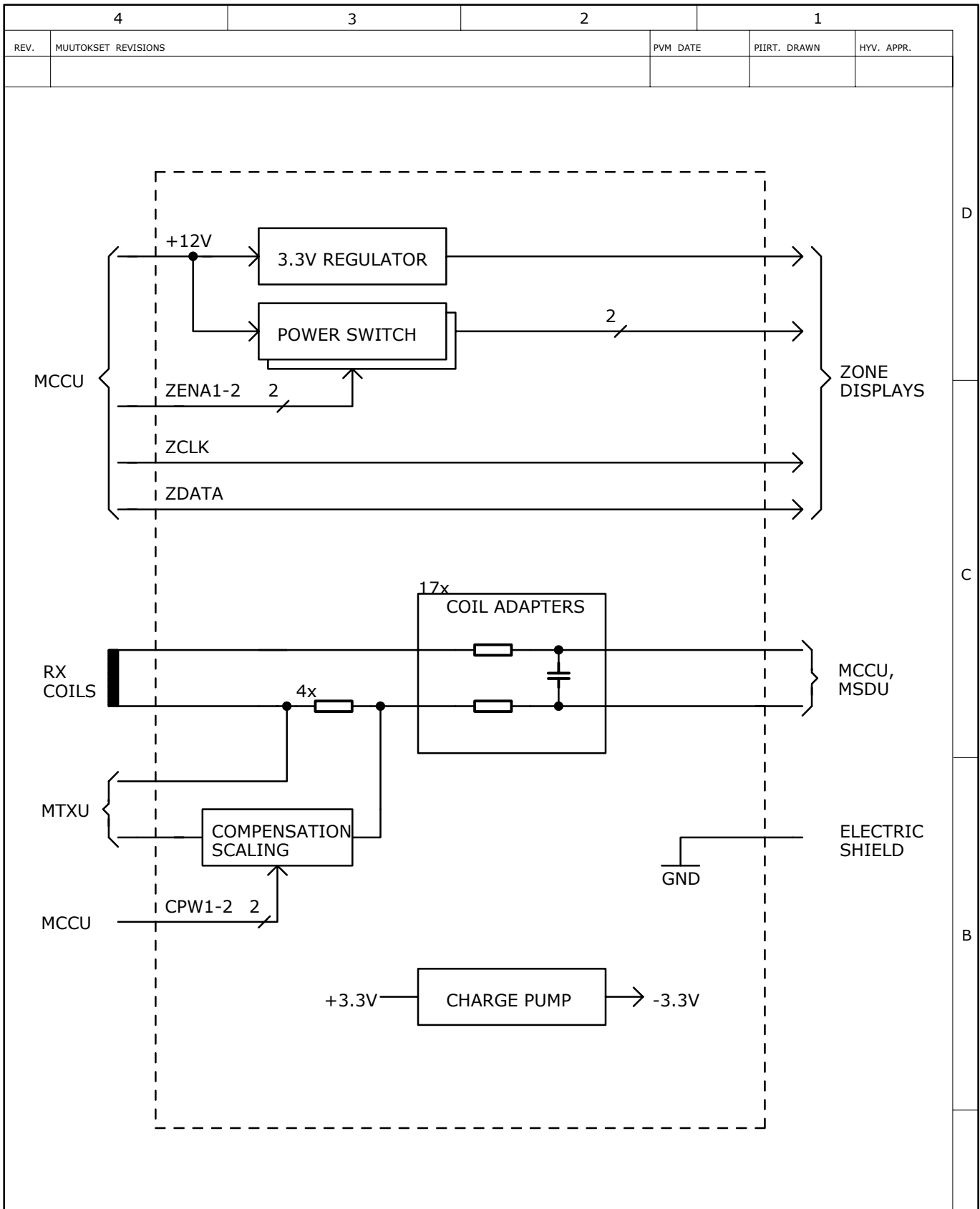
### 3 REVISION HISTORY

Rev. 1.01, 28.10.2008

- Added MRXU 5222 / TV.

Rev. 1.00, 29.06.2006

- Accepted in production 11.05.2007 ORA.



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
4	3	2	1	
OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY	
VLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2006 08 MTL	PIIRT. DRAWN 2006 08 MTL	A
SUHDE SCALE		TARK. CHECKED	HYV. APPROVED	
LIITTYV. NEXT ASSY MRXU 5181		TUOTE PRODUCT Metor 300 EMD		
MRXU 5181 Block Diagram		OSAL.N:O PART LIST 8100 892-40	REV. 01	
Rapiscan systems An OSI Systems Company		PIIR.N:O CODE 9100 650-4LE		
		Page 1/1		

## **Accessories and Spare Parts**

Last.revision: 03

Revision updated: 13.11.2008

Version:

Accept:

8101063 ACCESSORIES M300 EMD				1,000 KPL		
L. Line	Item	Dty	Description	Qty	U/M	Feat.
1	10	8101010	4OE MBBS 5189 M300 EMD BATTERY BACK-UP	1,000	KPL	
1	40	8101030	4OE MAINTENANCE KIT M300 EMD	1,000	KPL	
1	50	8101029	4OE ON-SITE KIT M300 EMD	1,000	KPL	
1	60	8100676	4OE MNES 5130 NETWORK 3 PRO SET METOR	1,000	KPL	
1	70	8100948	4OE METOR 300 CARRYING CASE SET	1,000	kpl	
1	80	8100928	4OE ADAM / M300 EMD-CABLE RS232	1,000	KPL	
1	90	8101260	RX & TX MAINTENANCE COIL CABLE M300 EMD	1,000	KPL	
1	100	8101261	RX - MSDU MAINTENANCE CABLE M300 EMD	1,000	KPL	
1	120	9100633	4VE MAINTENANCE MANUAL METOR 300 EMD	1,000	KPL	
1	130	8101128	4OE MRDS 5196 M300 EMD REMOTE DISPLAY SET	1,000	KPL	
1	140	8101124	4OE METOR TEST OBJECT SET	1,000	KPL	



Last.revision: 03

Revision updated: 13.11.2008

Version: PLANNING

Accept:

		8101029	ON-SITE KIT M300 EMD		1,000 KPL
L. Line	Item	Dty	Description	Qty	U/M Feat.
1	10		RX & TX Coil Cable M300 EMD	1,000	KPL
1	30		RX - MSDU Cable M300 EMD	1,000	KPL
1	40	4OE	ZONE DISPLAY CABLE M300 EMD	1,000	KPL
1	50	4OE	DISPLAY CABLE M300 EMD	1,000	KPL
1	60		ETHERNET CABLE CAT-5 RJ45 0.5m UTP GREY OR BEIGE	1,000	KPL
1	70		ETHERNET CABLE CAT-5 RJ45 1.0m STP RED or ELFA 25-509-86 or FARNELL 300-7250	1,000	KPL
1	80		MAINS CABLE 230V 2,5M EUROP. SHUKO 27904	1,000	KPL
1	90		POWER CORD 115V USA 15FT/4.6M L.GREY 3x18 AVG	1,000	KPL
1	100		POWER CORD UK GREY STRAIGHT 2M 355565 VOLEX BS1363/A 10A/250V FUSE 13A or FARNEL 285-626 / 355565 VOLEX or RS 425-418	1,000	KPL
1	110	4ME	REFLECTOR DIA 70mm MTXS	2,000	KPL
1	120		FUSE GLASS TUBE 5x20MM T2AL/H250V IEC/UL GMC-2A COOPER BHUSSMANN	10,000	KPL
1	130		KEY 839306841 ABLOY CL109C	2,000	KPL
1	150		FURNITURE SCREW M6x55 Fe/BLACK	8,000	KPL
1	160		HEXACON SOCKET KEY T-HANDLE 4x100MM 224-100 TURNUS	1,000	KPL

Last.revision: 02

Revision updated: 13.11.2008

Version: PLANNING

Accept:

8101030 MAINTENANCE KIT M300 EMD				1,000 KPL		
L. Line	Item	Dty	Description	Qty	U/M	Feat.
1	10		ON-SITE KIT M300 EMD	1,000	KPL	
1	20	8100883 4OE	MELS 5172 ELECTRONICS SET M300 EMD	1,000	KPL	
1	30	8101018 4OE	MCDS 5190 M300 EMD CONTROL AND DISPLAY SET	1,000	KPL	
1	40	8100894 4OE	MZDU 5183 ZONE DISPLAY UNIT M300 EMD	1,000	KPL	
1	50	8100774 4OE	MTLS 5169 M300 P, EMD TRAFFIC LIGHT SET	1,000	KPL	
1	60	8101240	MTXU 5221 Transmitter Unit	1,000	KPL	
1	70	8101241	MRXU 5222 Receiver Unit	1,000	KPL	
1	80	8100755 4OE	TRAFFIC COUNTER SET 1700mm M300v.3, EMD	1,000	KPL	

## **Error Messages and Troubleshooting**

Author J Niemi / J.Tykkyläinen	Rev. 1.00	Code 9100 634-4VE
Approved ORA	Date 13.12.2006	Document
Product Metor 300 EMD		Archives Metor 300 EMD
Title <b>FAULT TRACING AND ERROR MESSAGES</b>		

## 1 FAULT TRACING

Here is listed some possible failures.

Symptom	Possible cause	Corrective action
No power to RX or TX panel	Resetable fuse F1 or F6 tripped or failed	Cycle power; check MTXU/MRXU for short circuit; replace fuse;
Traffic counter does not work, traffic lights are always red	Coil panels are not aligned vertically Photocell mounted incorrectly	Adjust distance between coil panels at bottom Rotate photocell 180 degrees
No power to MELS; fuses in the power entry module are OK	Fuse located in the power supply PCB has failed	Replace fuse with equivalent rating
Random alarming	External electromagnetic interference	Change operating frequency, relocate detector

## 2 ERROR MESSAGES

In the following are explained errors that are shown on the Display Unit.

Error Message	Possible cause	Corrective action
SYSTEM MESSAGE: ERROR CODE XXX	Depends on error number; see next table	Cycle power on the unit, if reappears contact service
SYSTEM MESSAGE: MDPU Vcc TOO LOW	Display unit extension cable is too long, Power supply failure	Try shorter extension cable Replace MDPS or MELS
SYSTEM MESSAGE: MDPU TEMP TOO LOW	Ambient temperature is too low	Wait for the Display unit to warm up
SYSTEM MESSAGE: MDPU TEMP TOO HIGH	Ambient temperature is too high, direct sunlight to display unit	Move display unit to shadow
SYSTEM MESSAGE: MDPU EEPROM INIT.	Memory was corrupted	Cycle power on the unit; verify that all parameters are correct!
SYSTEM MESSAGE: ACCESS CODES INIT.	The Learn –button was pressed for more than five seconds	Re-set all access codes
BATTERIES OF REMOTE CONTROL ARE EMPTY!	Empty batteries on remote control	Replace batteries
LOW REMOTE CONTROL BATTERY LEVEL!	Almost empty batteries on remote control	Replace batteries soon
SYSTEM MESSAGE: MCCU Vcc TOO LOW	Power supply failure MCCU failure	Replace power supply Replace MCCU

SYSTEM MESSAGE: MCCU TEMP TOO LOW	Ambient temperature is too low	Wait for the electronics to warm up.
SYSTEM MESSAGE: MCCU TEMP TOO HIGH	Ambient temperature is too high. Electrical failure	Move gate to cooler place  Replace MCCU.
SYSTEM MESSAGE: MCCU EEPROM INIT	Memory was corrupted.	Cycle power on the unit; verify that all parameters are correct!
SYSTEM MESSAGE: RX-CABLE FAILURE! (CABLE 1 or 2)	RX –cable(s) is/are loose or disconnected.	Connect cable to RX –panel, replace cable(s)
SYSTEM MESSAGE: TX-CABLE FAILURE!	TX –cable is loose or disconnected.	Connect cable to TX –panel, Replace cable
SYSTEM MESSAGE: RECEIVER FAILURE X! (X is channel #)	RX Coil failure RX Cable failure Electrical failure	Check RX coil resistancies Replace RX 1 or 2 cable Replace MSDU, MCCU or MRXU
SYSTEM MESSAGE: TX X FAILURE! (X is channel #)	TX Coil failure TX Cable failure Electrical failure	Check TX coil resistancies Replace TX cable Replace MCCU or MTXU
SYSTEM FPGA NOT RESPONDING!	Electronics failure	Cycle power, Replace MCCU
OPERATION FAILED: NO REPLY FROM MCCU	Display unit cannot communicate with electronics, MCCU failure MDPS failure	Verify that display unit cable is connected properly; Replace Display Unit cable Replace MCCU Replace MDPS
MAX COUNT OF REMOTES IS VALIDATED!	No more remote control units can be taught to gate	Remove all remotes and try again. NOTE: This disables ALL previously taught remotes
CUSTOM PARAMS ARE NOT SET!	No custom parameters are saved	Save parameters before loading them
NO METAL DATA FROM MCCU	The MDPU does not get metal signal from the MELS MCCU failure MDPS failure	Check MDPU cable, cycle power, Replace MCCU Replace MDPS
MCCU PARAMS CORRUPTED!!	MCCU parameters are corrupted.  MCCU failure	Cycle power on the unit; verify that all parameters are correct! Replace Display Unit cable Replace MCCU
NO REPLY FROM MDPU!	Display unit cannot communicate with electronics, MCCU failure MDPS failure	Verify that display unit cable is connected properly; Replace Display Unit cable Replace MCCU Replace MDPS

### 3 ERROR NUMBERS

In the following are explained error numbers that are shown on the Display Unit as “SYSTEM MESSAGE: ERROR CODE XXX”

Code	Error	Possible cause
128	Not in use	
129	Not in use	
130	Not in use	
131	Not in use	
132	Not in use	
133	Not in use	
134	Not in use	
135	Not in use	
136	<i>Calibration value was too low</i>	
137	<i>Calibration value was too high</i>	
138	Not in use	
139	Not in use	
140	I2C bus collision	A component connected to I2C has failed
141	No ACK from I2C bus	A component connected to I2C has failed
142	I2C timeout error	A component connected to I2C has failed
143	Invalid command from I2C	A component connected to I2C has failed
144	Data packet checksum	RS232 communication error in MCCU
145	Invalid USART command	RS232 communication error in MCCU
146	Unexpected error during saving the packet!	MRCU failed to save data to EEPROM
147	Unexpected error during loading the packet!	MRCU failed to load data from EEPROM
148	There is not enough memory in the EEPROM!	MRCU error trying to save multiple pages
149	EEPROM is totally full!	MRCU error
150	Error during page write!	MRCU error
151	Error during page read!	MRCU error
152	Tried to save data with illegal ID (0xFF)!	MRCU error
153	Error in writing FAT entry!	MRCU error
154	Error in writing Info-page!	MRCU error
155	Error during packet write!	MRCU error
156	Error during packet read!	MRCU error
157	Wanted ID-type of data was not found from the EEPROM!	MRCU error
158	Data with wanted index was not found from the EEPROM!	MRCU error
159	Can not load the packet, because EEPROM is empty!	MRCU error
160	FAT-page loading failed!	MRCU error
161	Raw Read/Write-operation is pointed to invalid EEPROM!	MRCU error
162	Raw Read/Write-operation is pointed to illegal page!	MRCU error
163	Info-page loading failed!	MRCU error
164	Page checksum error!	MRCU error

165	LCD-timeout, no response!	MDPU alphanumeric display failure
166	Invalid parameter value	Zone number
167	Invalid parameter value	Program number
168	Invalid parameter value	Sensitivity setting
169	Invalid parameter value	Frequency number
170	Invalid parameter value	HP –filter setting
171	Invalid parameter value	LP -filter setting
172	Invalid parameter value	Alarm delay setting
173	Invalid parameter value	Count direction setting
174	Invalid parameter value	Decrement mode setting
175	Invalid parameter value	Volume setting
176	Invalid parameter value	Volume min. setting
177	Invalid parameter value	Tone number
178	Invalid parameter ID	No such parameter number
179	Not in use	
180	Invalid parameter value	Display Mode
181	Invalid parameter value	Zone on/off
182	Invalid parameter value	Traffic light on/off
183	Invalid parameter value	Red on delay
184	Invalid parameter value	Zone on delay
185	No reply from Metor	No reply from Metor (MetorNet)
186	MRCU eeprom init	MRCU EEPROM initialiazed
187	MDPU eeprom cleared	MDPU has cleared EEPROM
188	Parameter index illegal	Parameter index was not recognized
189	NVRAM address illegal	Non-volatile memory address was illegal
190	Not in use	
191	Error I/O failed	Production test: I/O-test failed. Requires loopback connector to I/O.
192	MetorNet port failed	Production test: MetorNet port has failed. Requires loopback connector to MetorNet port.
193	NVRAM test failed	Non-volatile RAM failed (RTC chip)
194	Not in use	
195	Not in use	
196	Alive query not responded!	MDPS didn't response to MCCU alive queries within 5 seconds
197	MetorNet address illegal value	Illegal value for parameter
198	MetorNet random illegal value	Illegal value for parameter
199	Invalid parameter value	Tamper
200	Invalid parameter value	Login type (alpha, numeric)
201	Invalid parameter value	Random rate
202	Invalid parameter value	Random tone
203	Invalid parameter value	Random volume
204	Invalid parameter value	Random display
205	Invalid parameter value	Key Volume
206	Invalid parameter value	Power indication
207	Invalid parameter value	Standby mode
208	Invalid parameter value	MCCU standby mode
209	Invalid parameter value	Compensate value
210	Invalid parameter value	Frequency search
211	Invalid parameter value	Parameter guard

## Revision History



## REVISION HISTORY

Rev. 02, 15.01.2009 / TV

- Chapters reorganized.
- Added MTXU 5221 and MRXU 5222.
- Document revisions updated.

Rev. 1.30, 30.4.2008

- Document revisions updated.

Rev. 1.20, 6.2.2008

- Document revisions updated.

Rev. 1.10, 15.8.2007

- Document revisions updated.

Rev. 1.00, 28.6.2006

- Accepted in production 11.5.2007 ORA