


TM MX4 Vehicle System

System HW Components Covered by this Guide

- MX4 Vehicle Computer with SIM card
- Antenna
- Driver Display
- Cable Harness and Interconnection Cables
- PTC Installation
- Internal TFT Passenger Displays
- Connecting External Equipment

- All components (connectors, cables, relays, switches etc.) needed for connecting vehicle signs, Vehicle CAN, the on-board audio system and customer/vehicle specific other equipment will vary greatly and cannot be covered fully by this guide.


Installation base kit: Hardware Units

Components	Image
<p>Vehicle Computer: MX4</p>	
<p>GPS/GSM Antenna: In or outdoor type, depending on installation</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Outdoor antenna (Through hole mounted)</p> </div> <div style="text-align: center;">  <p>Indoor antenna (adhesive mounted)</p> </div> </div> <p style="text-align: center;">OR</p>
<p>Driver Touch Display with/without frame, depending on mounting solution</p>	
<p>Display Holder (Depending on mounting solution.)</p>	




Installation base kit: Harnesses and Cables

Cable	Image
<p>Cable Harness 1 Non-PTC or PTC Version. With empty relay holder and either mounted sign control switch, or bridged switch connectors, depending on installation.</p>	
<p>Cable Harness 2 Non-PTC or PTC Version, depending on installation</p>	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Harness 2: PTC</p> </div> <div style="text-align: center;">  <p>Harness 2: Non-PTC</p> </div> </div>
<p>VGA-DVI Display Cable (5/10m, depending on project)</p>	
<p>USB Display Cable (5m)</p>	
<p>Driver Display Power Cable Kit (Cut cable to suitable length.)</p>	

Sign Controller Switch (Depending on Installation)

Components	Image
<p>Switch: MX4 or ICU 400 Sign control.</p> <p>(The switch may also be pre-mounted on Harness 1, depending on installation.)</p>	

Passenger Display Installation Kit (Depending on Installation)

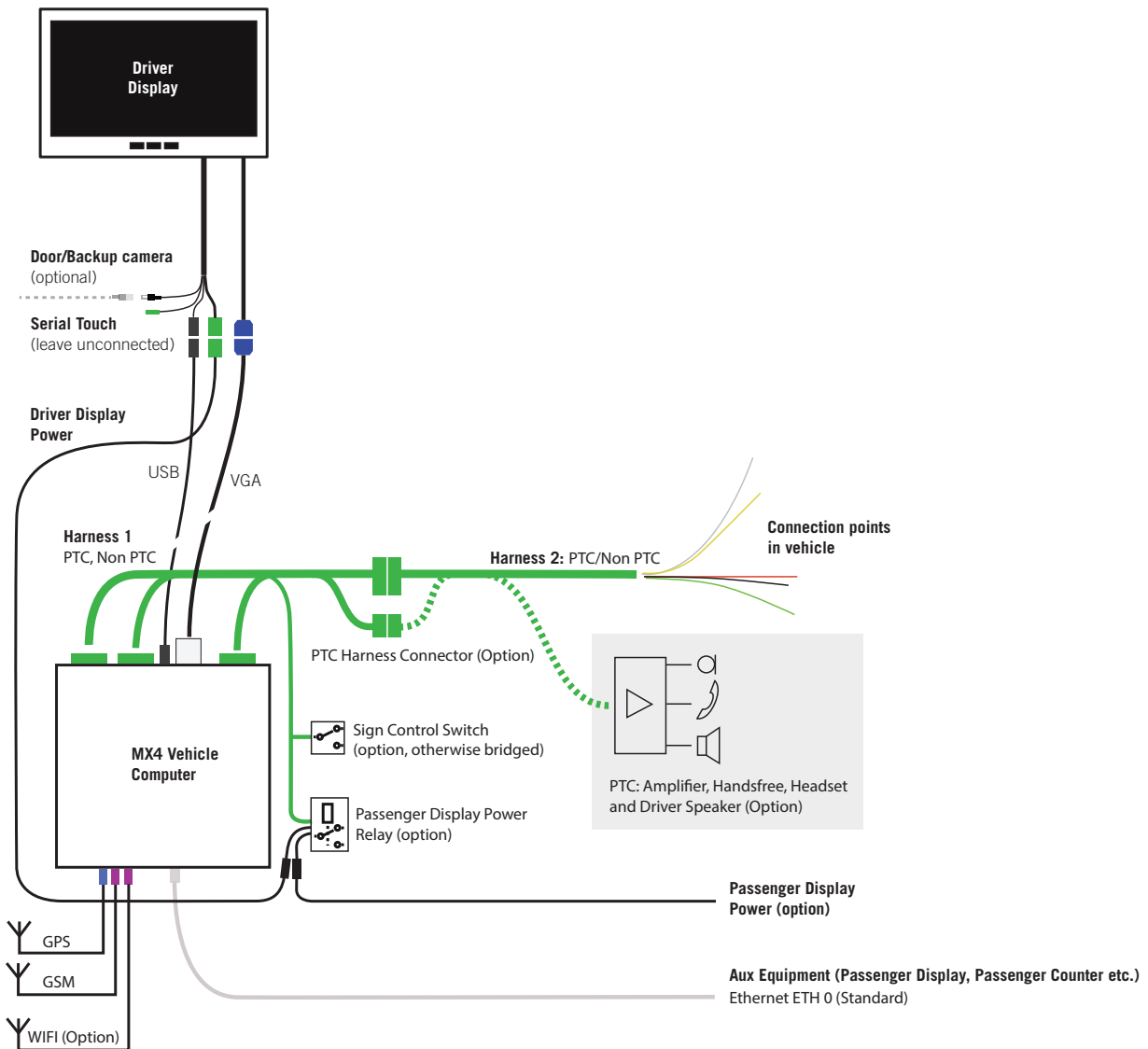
Components	Image
<p>Passenger Display Power Cable (Display side connectors, depending on installed equipment.)</p>	
<p>Passenger Display Power Relay</p>	
<p>Passenger Display Ethernet Cable</p>	

PTC Installation Kit (Depending on Installation)

Cable	Image
<p>Amplifier, Bosch 12/24V, including connectors w. cables</p>	
<p>Handsfree Microphone</p>	
<p>Handset</p>	
<p>Driver Speaker</p>	
<p>Relays, 3pcs</p>	<p>24V Relay 12V Relay</p> 
<p>DIN Rail</p>	

Installation, Overview

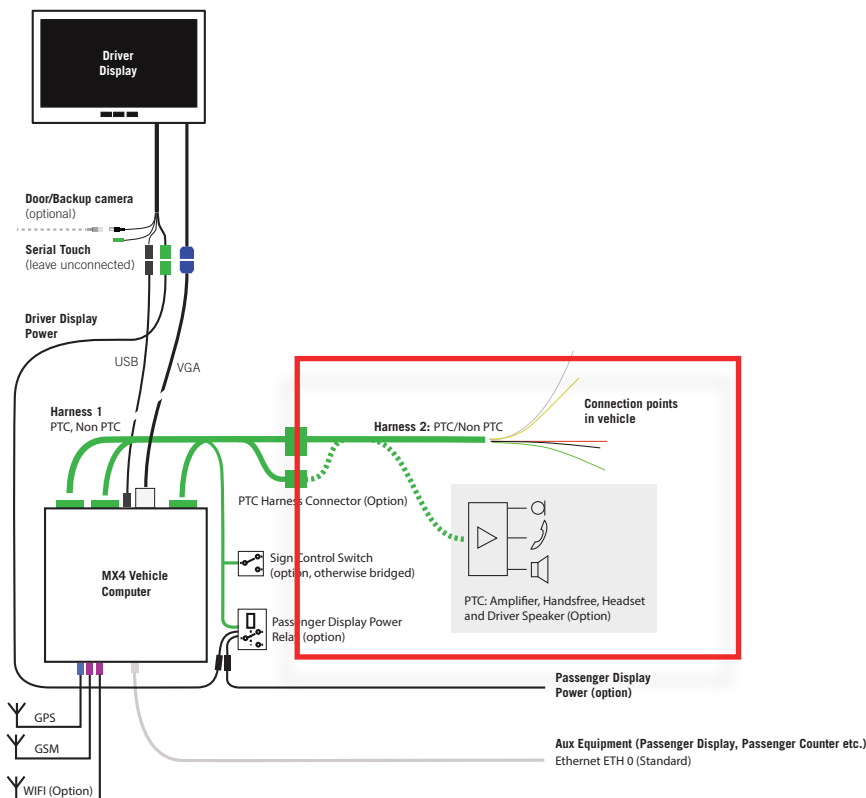
- Installation is normally performed starting with routing and connecting Harness 2. (Factory installation may only include this step).
- When Harness 2 is routed and connected, the vehicle computer, driver display and surrounding equipment can be installed.



Installation, Step-by-

1. Route and Connect Harness 2

- Route from vehicle computer mounting location to connection points in vehicle (vehicle and installation dependent). See next page for leader color codes, signal descriptions and connection details.
- If the installation includes TFT passenger display, the Ethernet and power cables for this display may be routed together with harness 2.
- Audio installation varies with existing equipment and specified functionality. See step 7 and supplied Schematics
- For installation including PTC, see step 8 and supplied Schematics.

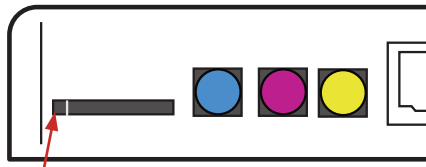


Vehicle System Installation

MX4 Pinout - Cable Color Codes, Signals and Connections

Pin	Function	use	Comment	Cable color		Cable type
JAE IL-AG5-22S-D3C1						
1	CAN-1-H	SUDBURY J1939	DEMOBAGS AND DIAGNOSTIC CONNECTOR		TWISTED BROWN	R2G4 0,75
2	CAN-1-L	SUDBURY J1940	DEMOBAGS AND DIAGNOSTIC CONNECTOR		TWISTED PINK	R2G4 0,75
3	CAN-2-H	FMS			TWISTED YELLOW	R2G4 0,75
4	CAN-2-L	FMS			TWISTED GREEN	R2G4 0,75
5	GND		Reference for all I/O and communication buses	NO USE		
6	4-20mA-PWR		Digital output for powering 20-apr mA sensors	NO USE		
7	DIG-OUTPUT-1	act cabin sound	GOES HIGH ON ACTIVATION (SYSTEM VOLTAGE)		BLUE/RED	R2G4 0,75
8	DIG-OUTPUT-2	act external sound	GOES HIGH ON ACTIVATION (SYSTEM VOLTAGE)		BROWN	R2G4 0,75
9	DIG-OUTPUT-3	act driver sound	GOES HIGH ON ACTIVATION (SYSTEM VOLTAGE)		PINK	R2G4 0,75
10	DIG-OUTPUT-4	Inner TFT	GOES HIGH ON ACTIVATION (SYSTEM VOLTAGE)		WHITE	R2G4 0,75
11	DIG-INPUT-1	Sign control switch	<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE		ORANGE	R2G4 0,75
12	DIG-INPUT-2		<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE		PURPLE/YELLOW	R2G4 0,75
13	DIG-INPUT-3	Door	<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE		ORANGE/BLACK	R2G4 0,75
14	DIG-INPUT-4	Stop	<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE		YELLOW	R2G4 0,75
15	DIG-INPUT-5	Panic button	<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE		GREEN	R2G4 0,75
16	DIG-INPUT-6		<+10 TO ACTIVATE INPUT / >+2V TO INACTIVATE	NO USE		
17	GND		Reference for all I/O and communication buse	NO USE		
18	N/A			NO USE		
19	ANALOG-IN-2		20-apr mA input	NO USE		
20	ANALOG-IN-3		0-32 V input	NO USE		
21	ANALOG-IN-4		0-32 V input	NO USE		
22	PULSE-COUNTER		Input for tachometer		GREY	R2G4 0,75
JAE IL-AG5-18S-D3C1						
Pin	Function		Comment			
1	RS485-A	SIGN NETWORK	RS485+		TWISTED SHIELD WHITE	R2G4 0,75
2	RS485-B	SIGN NETWORK	RS485-		TWISTED SHIELD GREEN	R2G4 0,75
3	J1708-A			NO USE		
4	J1708-B			NO USE		
5	DIG-OUTPUT-5V	ACT PTC RELAY	GOES HIGH ON ACTIVATION (SYSTEM VOLTAGE)		PURPLE	R2G4 0,75
6	GND		Reference for all communication buses	NO USE		
7	GND		Reference for all communication buses	NO USE		
8	INPUT-POWER	B+			RED	R2G4 1,5
9	GND	Battery ground	Reference for INPUT-POWER		BLACK	R2G4 1,5
10	ANALOG-IN-1	30+	0-32 V input, must be high for the unit to start		RED/GREEN	R2G4 0,75
11	N/A			NO USE		
12	RS232-2-RXD		RS-232 no. 2 - Data input	NO USE		
13	RS232-2-TXD		RS-232 no. 2 - Data output	NO USE		
14	GND		Reference for all communication buses	NO USE		
15	RS232-1-TXD		RS-232 no. 1 - Data output	NO USE		
16	RS232-1-RTS		RS-232 no. 1 - RTS output	NO USE		
17	RS232-1-CTS		RS-232 no. 1 - CTS input	NO USE		
18	RS232-1-RXD		RS-232 no. 1 - Data input	NO USE		
JAE IL-AG5-14S-D3C1-A						
Pin	Function		Comment			
1	3G-AUDIO-IN-P		PTC mic positive		MIC YELLOW	audio kabel
2	CAN-3-H					
3	CAN-3-L					
4	N/A					
5	GND		Reference for all communication buses			
6	GND-A		Ground for audio announcements			
7	3G-AUDIO-IN-N		PTC mic negative		MIC BLACK	audio kabel
8	3G-AUDIO-OUT-P		PTC speaker positive		3G AUDIO YELLOW	audio kabel
9	3G-AUDIO-OUT-N		PTC speaker negative		3G AUDIO BLACK	audio kabel
10	GND-A		GND for audio announcements		AUDIO BLACK	audio kabel
11	AUDIO-IN-MIC		VOIP (not in use)			
12	AUDIO-IN-LINE		VOIP (not in use)			
13	AUDIO-OUT-R		Linux platform audio output, right (not in use)			
14	AUDIO-OUT-L		Positive for audio announcements		AUDIO YELLOW	audio kabel

2. Insert SIM Card in MX4



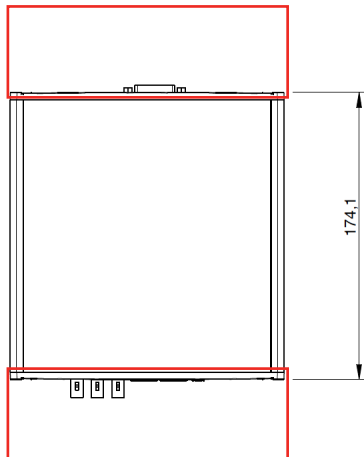
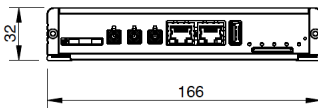
Eject SIM Card Holder

Note:

- > Be careful when you insert the SIM card. It can get stuck if not inserted correctly.

3. Mount Base Units in Vehicle

- Vehicle computer with integrated modem (MX4)
- MX4 Mounting Bracket
- Driver display with holder or frame.



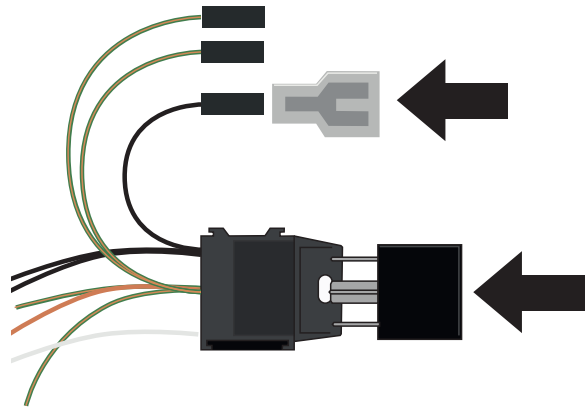
When mounting the HW units, remember to leave room for connectors, cables and for accessing SIM card holder slot.

Note:

- > The supplied bracket allows for mounting the MX4 computer standing on its side or flush with the mounting surface. See Appendix 5 for information on how to fold the bracket to adapt it to the mounting space.
- > Have in mind the space needed for connectors and cables around the units.
- > Make sure the SIM card slot is accessible.
- > The Driver Display can be mounted on a (optional) holder or in the dash, in a frame. See Appendix 3 for Display Frame measurements.
- > The customer may have specific requirements regarding the placement of the Driver display.

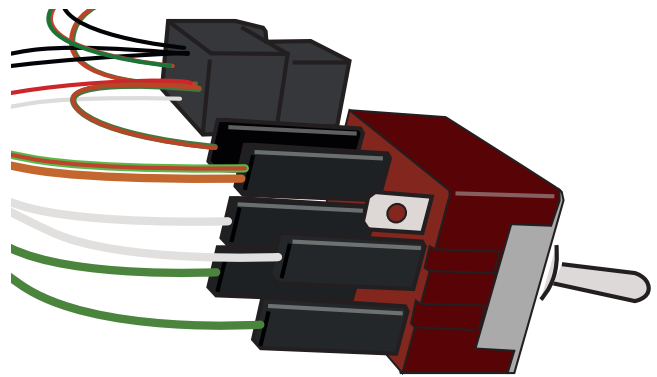
4. Prepare Harness 1 (if needed)

1. For installations that include passenger display, Harness 1 need to have a relay inserted in the relay holder and a Y-adaptor added to the Passenger display Power GND Connector. See Image.



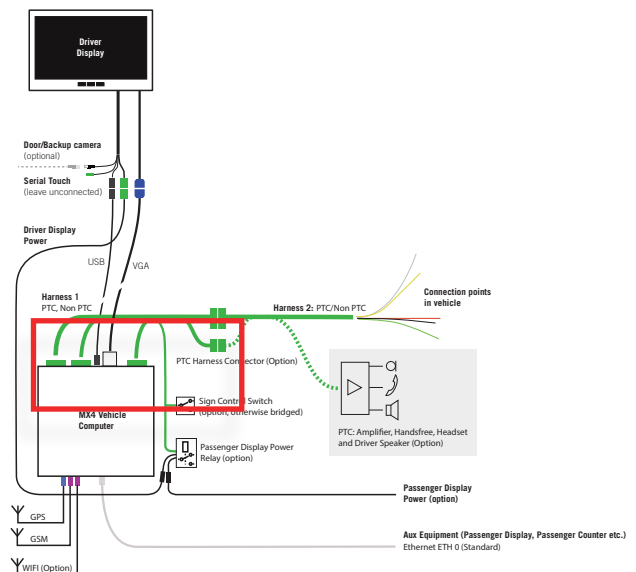
2. Depending on installation, Harness 1 is delivered with a sign controller switch mounted or, alternatively, with the harness switch connectors bridged.

If an alternative, separate, sign controller is to be integrated and the connectors are bridged you will have to remove the bridge connectors and connect the switch. See image for how to connect the switch.



4. Connect Harness 1 to MX4, route to Harness 2

1. Insert the three Harness 1 connectors into the MX4 (the connectors are unique and cannot be mixed up).
2. Route the harness around the MX4 and be certain to leave room for the not yet inserted connectors and cables. Connect Harness 1 to Harness 2. (If Harness 2 does not include PTC and have only one connector, leave the smaller Harness 1 connector free.)
3. Mount the switch (with switch position label) and relay holder on the bracket. See Appendix 5 for instruction how to mount the switch on the bracket.



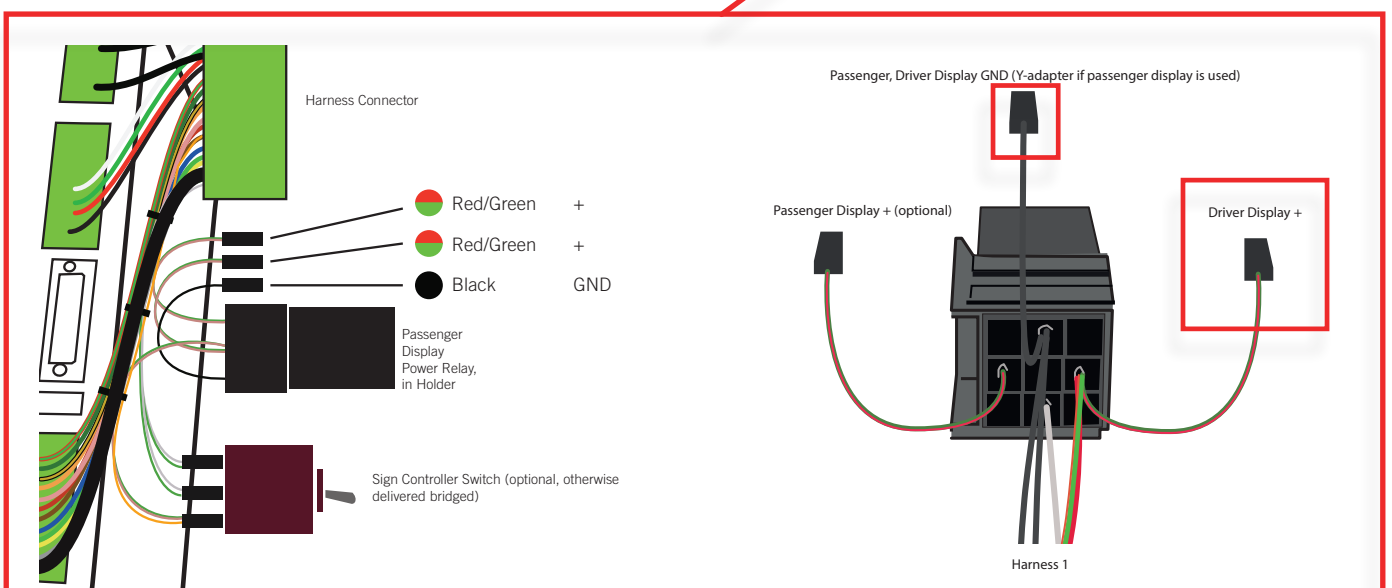
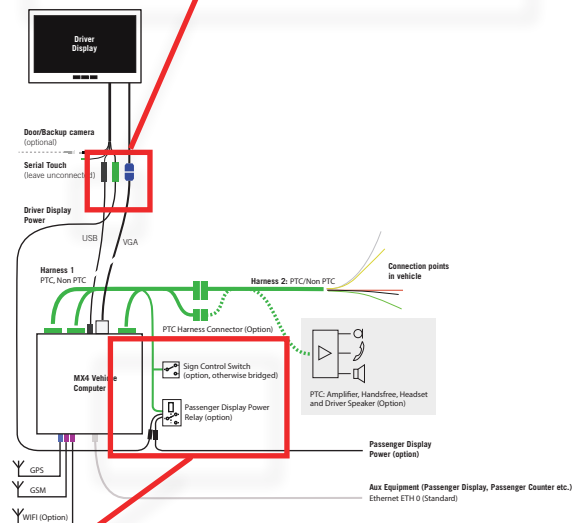
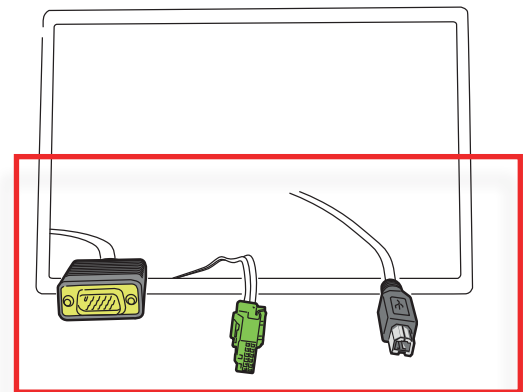
5. Route Display Cables, Connect Driver Display

Route the USB, VGA-DVI and driver display power cable, from the display to the MX4. Either USB port on the computer can be used.

Note! To avoid time consuming re-routing, make sure you route the display cables the right way - see image to the right showing the correct connectors sticking out of the dashboard hole.

Route the driver display power cable to the Harness 1 connectors connected to the Relay holder, see images below.

The driver and passenger display power cables in the harness have the same color code but work differently: The passenger display power is switched on/off by the relay and the driver display power is not. If the installation does not include a passenger display, and a relay is thus not inserted in the holder, the passenger display power connector will be unpowered. See image for identification.



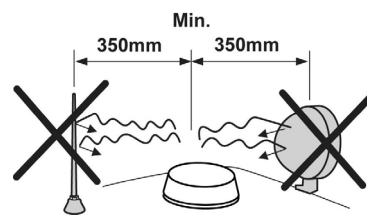
6. Mount and Connect Dashboard or Roof Mounted Antenna _____

Dashboard Mounted Antenna:

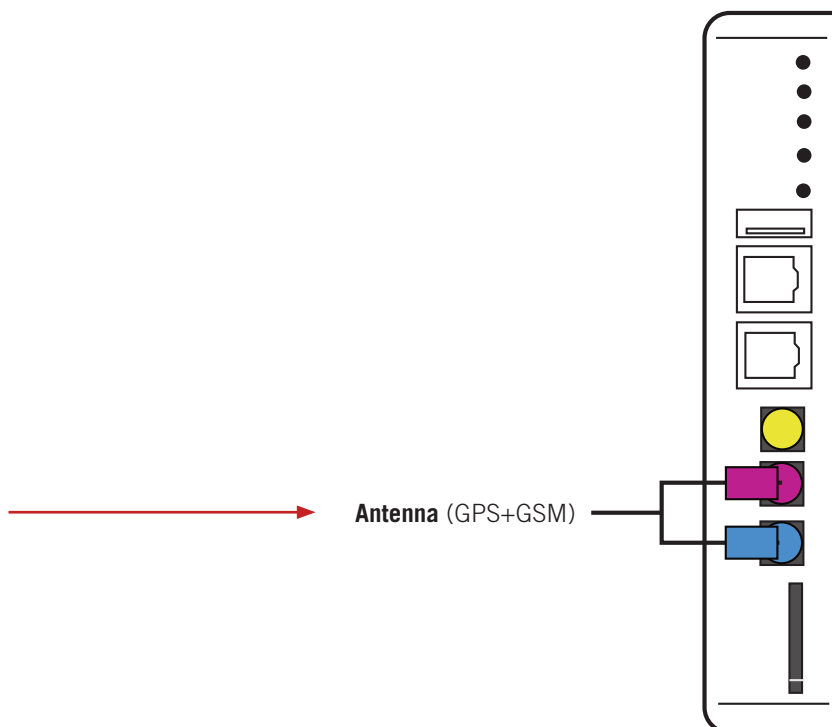
1. Fix antenna to dash at appropriate position w. included double sided adhesive pad.
2. Route antenna cable from mount position to modem, together with the display cables.
3. Connect to computer (see below).

Roof Mounted Antenna:

1. Check distance to nearby equipment before cutting hole.



2. Cut hole. \varnothing 19mm
3. Install antenna. Make sure the hole is sealed properly.
4. Route cable and connect to computer (see below).



7. Connect to Vehicle Audio (PA) System

Note that as audio installations vary a lot with existing vehicle PA system functionality, this instruction cannot be specific.

- If the installation includes PTC, the whole audio installation should be planned/performed as one single operation for optimal relay placement, cable routing etc. See step 8 and supplied Schematics.
- The vehicle system uses one audio channel together with control signals for amplifier remote enabling and relay switching for driver/on-board/external speakers. The function of these signals is configured in the Configuration Manager to suit specific amplifier functionality).
- If the installation includes a driver speaker, a separate amplifier and an additional relay may be needed in some cases (even when PTC is not included in the installation).
- Consult with the vehicle manufacturer and customer as to placement of the driver speaker.

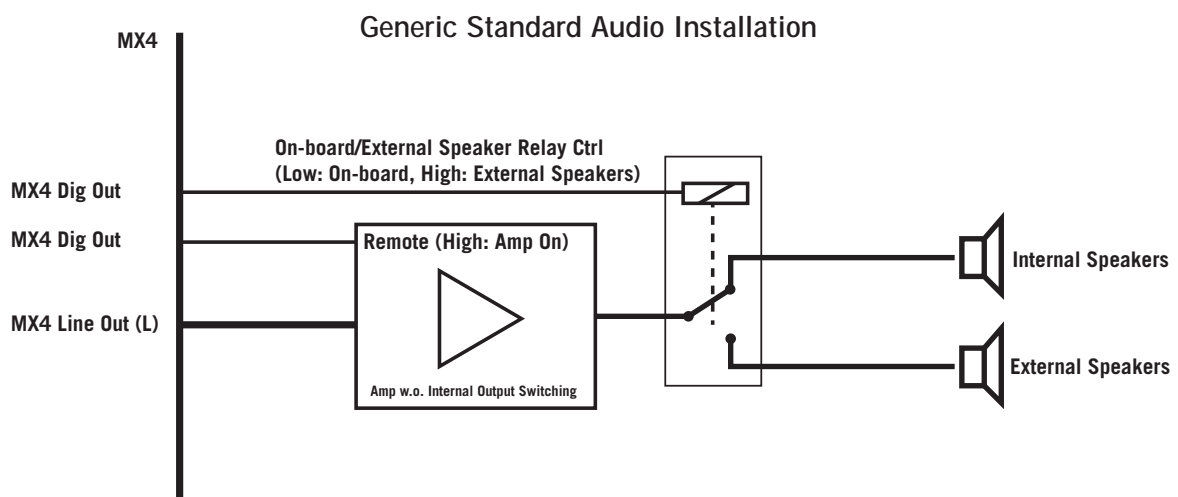
Use 12V or 24V Relays, depending on vehicle electrical system voltage.

Note that the 12 and 24V relays have their connections placed in different order. The markings of both types match the schematics.



12V Relay

24V Relay



8. Mount and Connect PTC Equipment (Option)

ITS4mobility PTC can be installed with or without driver handset. Depending on installation, the PTC installation kit may thus include an extra relay and a handset. **Use the corresponding schematics as guide for the installation.**

1. Mount Driver speaker, microphone and handset (optional). **Consult with customer/vehicle manufacturer as to placement of the equipment.**
2. Mount the relays
3. Route and connect equipment and harness 2 PTC cables to the relays and connection block.
4. Route and connect the rest of the cables.

Use 12V or 24V Relays, depending on vehicle electrical system voltage.

Note that the 12V and 24V relays have their connectors placed in different order. The markings of both types match the schematics.



12V Relay

24V Relay

9. Connect AUX Equipment (Depending on Installation)

APC, Ticket Machine etc.

On-board networked equipment like APC systems etc. are normally connected through on-board switches. If the ETH 0 connector is used by the Passenger Display (see next page), Connect the switch to the ETH 1 connector.

- For network connection, route suitable ethernet cable from free ethernet port directly to equipment or suitable switch in the vehicle.

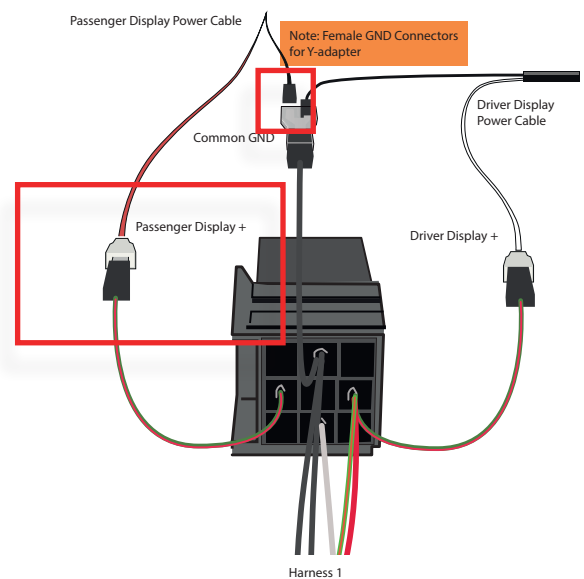
10. Connect Passenger TFT Display (Depending on Installation) —

One Passenger TFT Display

1. Route and connect Ethernet cable from ETH0 port on MX4 to the Passenger display. Alternatively, connect a switch to the MX4 ETH 0 port and connect the display to the switch.
2. Route the power cable from the passenger display to the power connectors (+) and the Y-adaptor (GND) in Harness 1 (see image) for relay switched power.

Note: Both the display and the (optional) switch should be connected to this relay switched power feed.

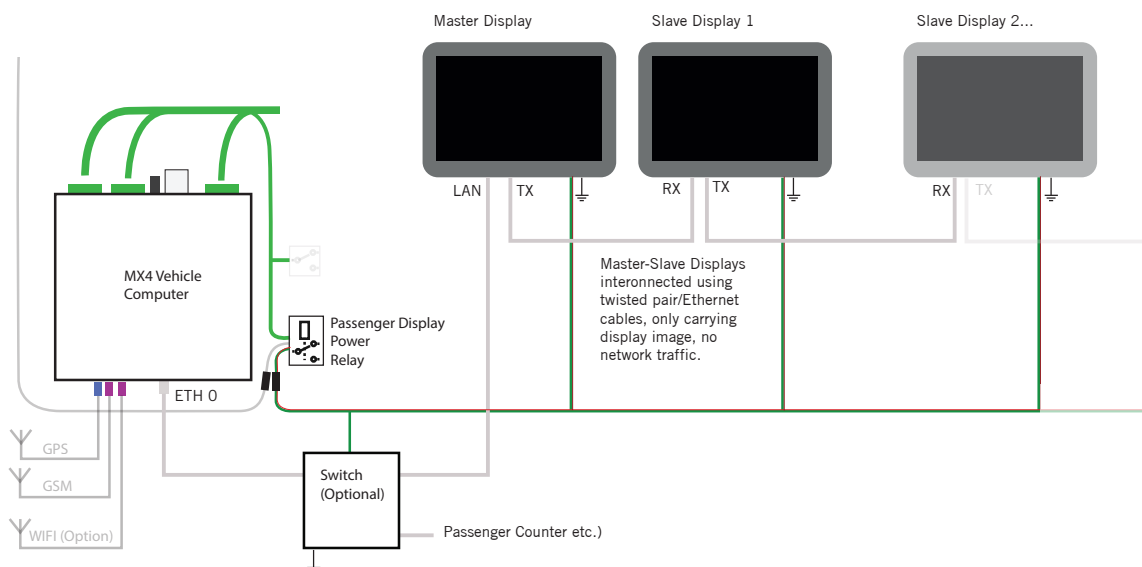
You need a female Passenger Display Power cable GND connector to fit in the Y-adaptor.



Multiple Passenger TFT Displays

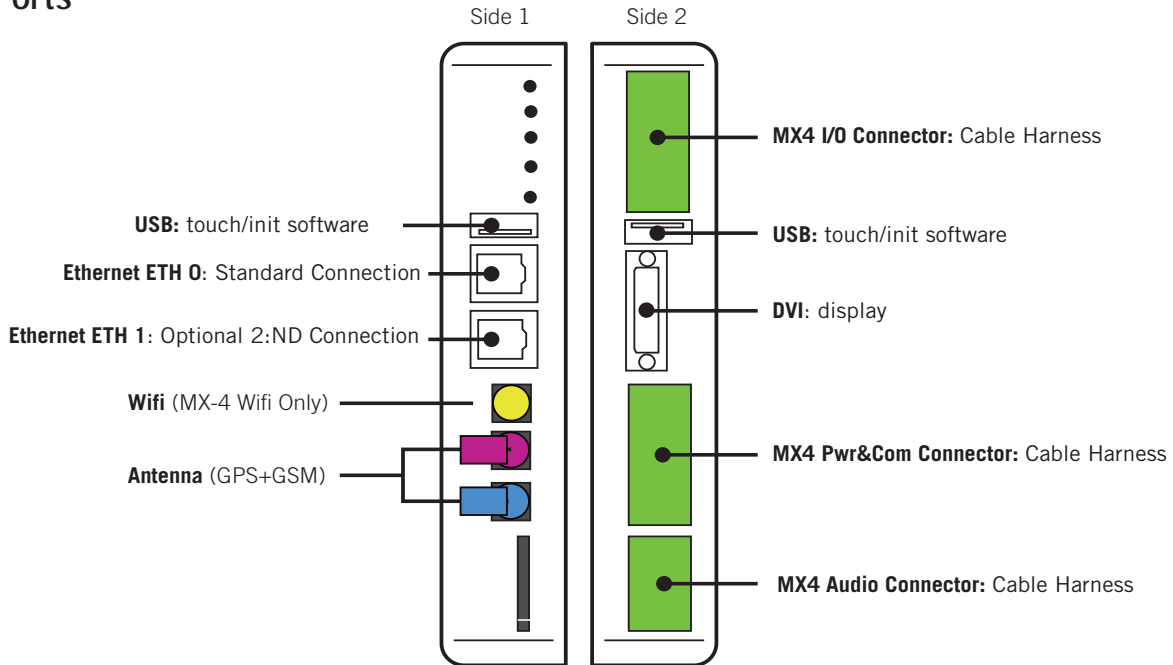
When multiple passenger displays are installed, one “Master” display is used with any number of slave displays, mirroring the image on the master display.

The displays are connected in series using twisted pair/Ethernet cables.



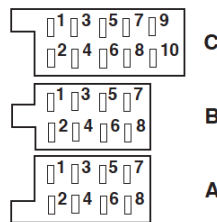
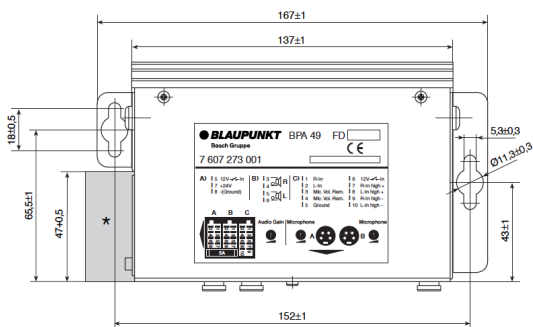
Appendix 1:

MX4 Ports



Appendix 2:

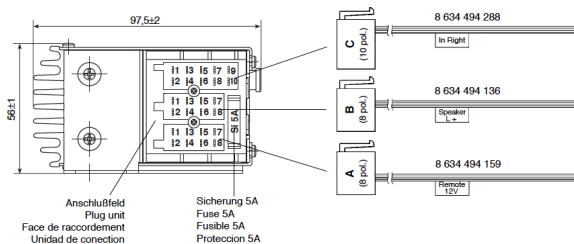
Bosch 12/24V Audio PA/PTC Amplifier Dimensions and Pinout



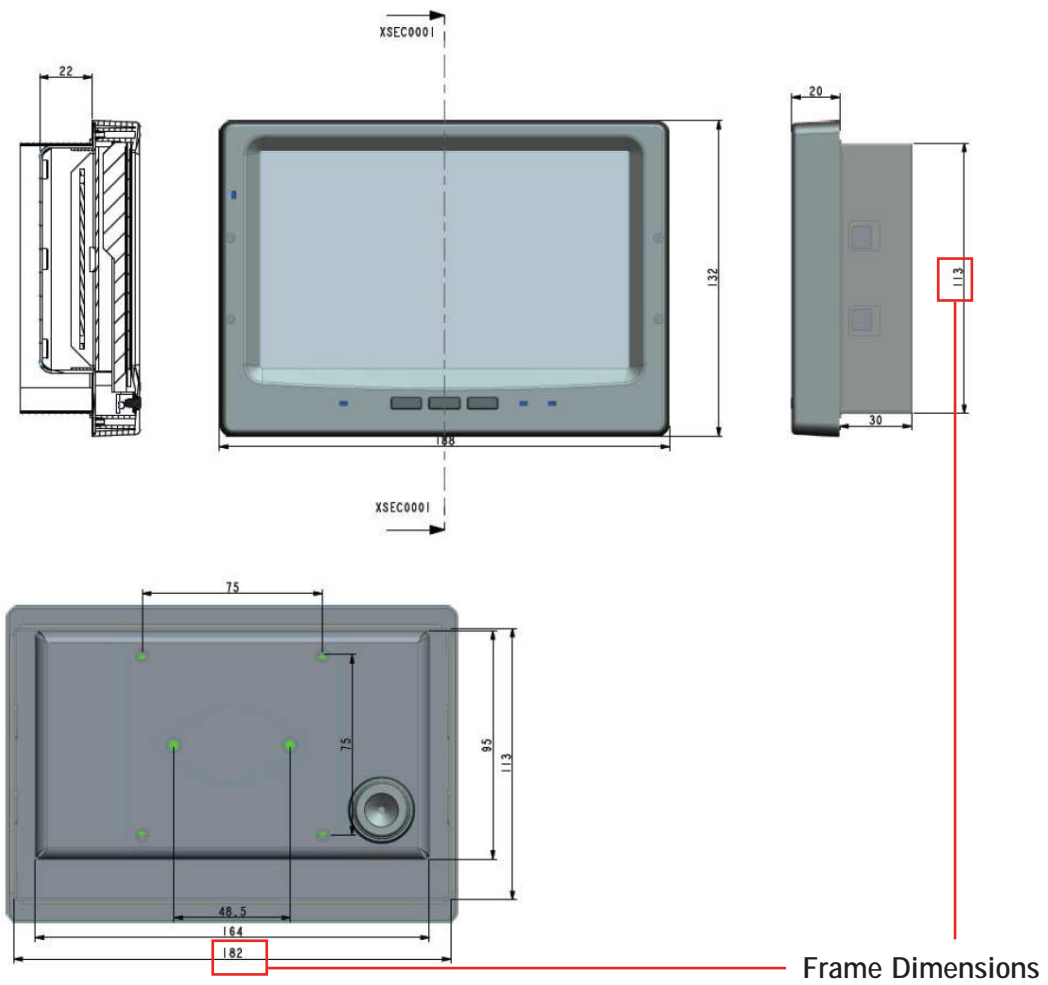
C - 1	Input Right	C - 6	Remote Input
C - 2	Input Left	C - 7	Input R high +
C - 3	Mic. Vol. Rem.	C - 8	Input L high +
C - 4	Mic. Vol. Rem. Ground	C - 9	Input R high -
C - 5	Input Ground	C - 10	Input L high -
B - 1	----	B - 5	Speaker L +
B - 2	----	B - 6	Speaker L -
B - 3	Speaker R +	B - 7	----
B - 4	Speaker R -	B - 8	----
A - 1	----	A - 5	Remote Input
A - 2	----	A - 6	----
A - 3	----	A - 7	Power + 24V
A - 4	----	A - 8	Power -

Hinweis: Anschluß A-5 und C-6 sind kurzgeschlossen.

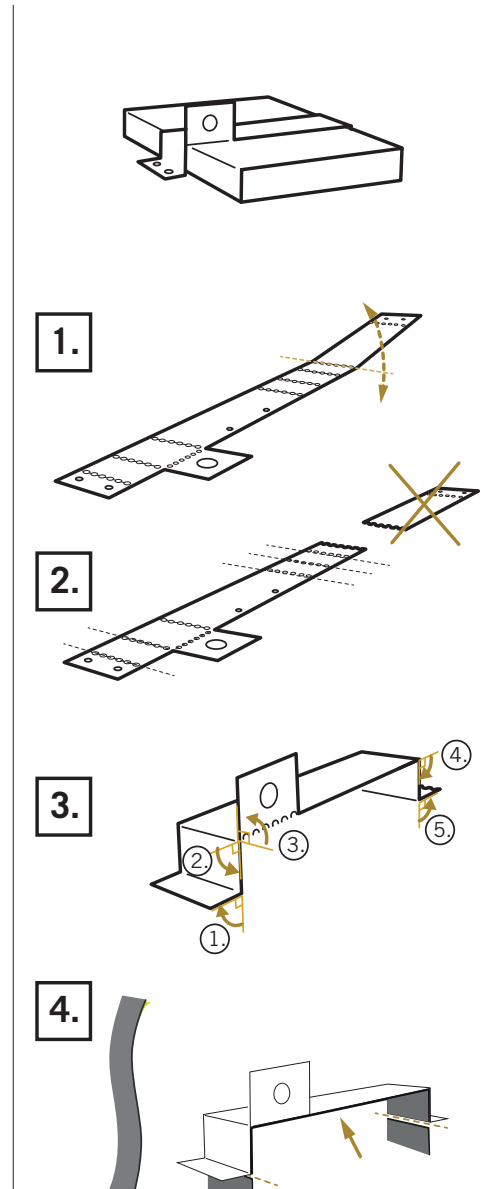
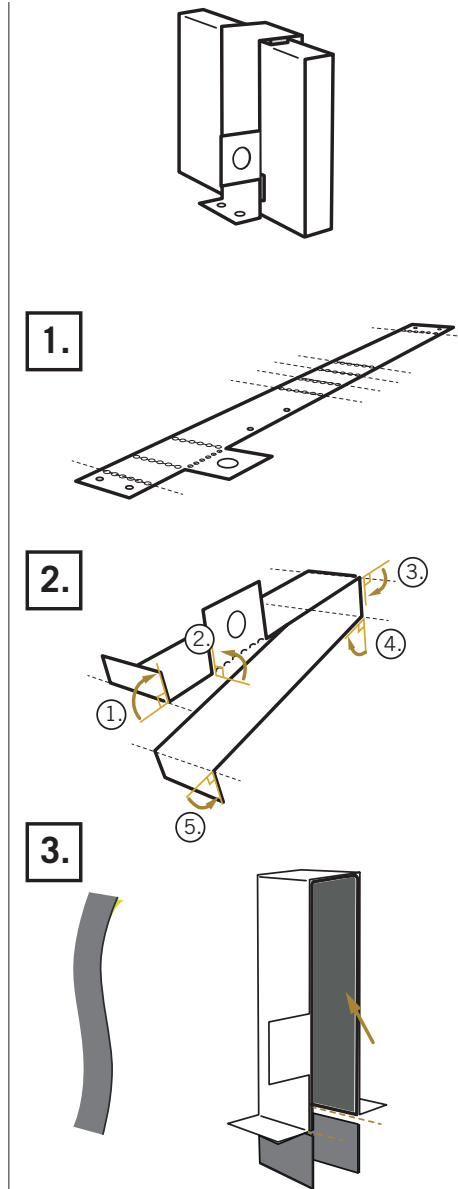
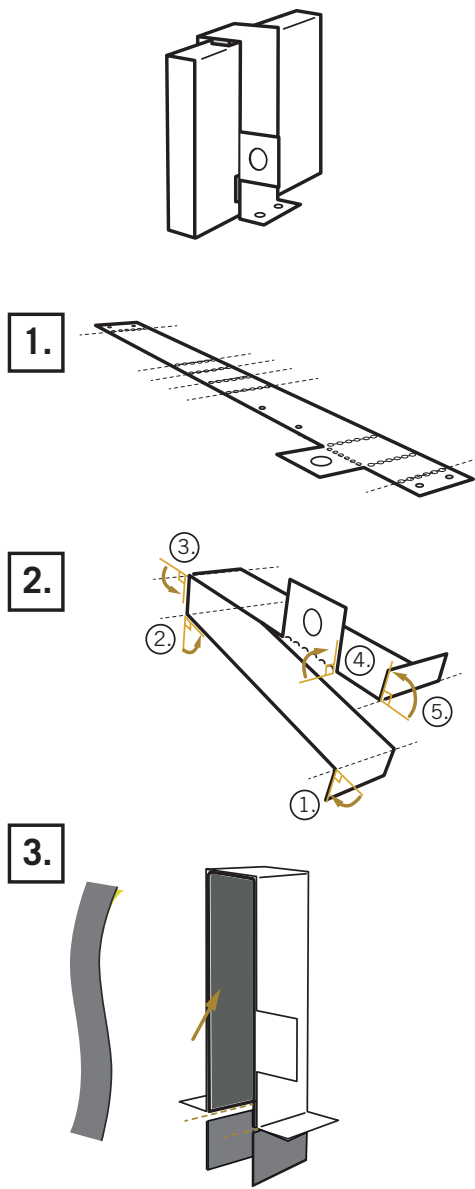
Note: Contact A-5 and C-6 are connected together.



Appendix 3: Display, Frame Dimensions

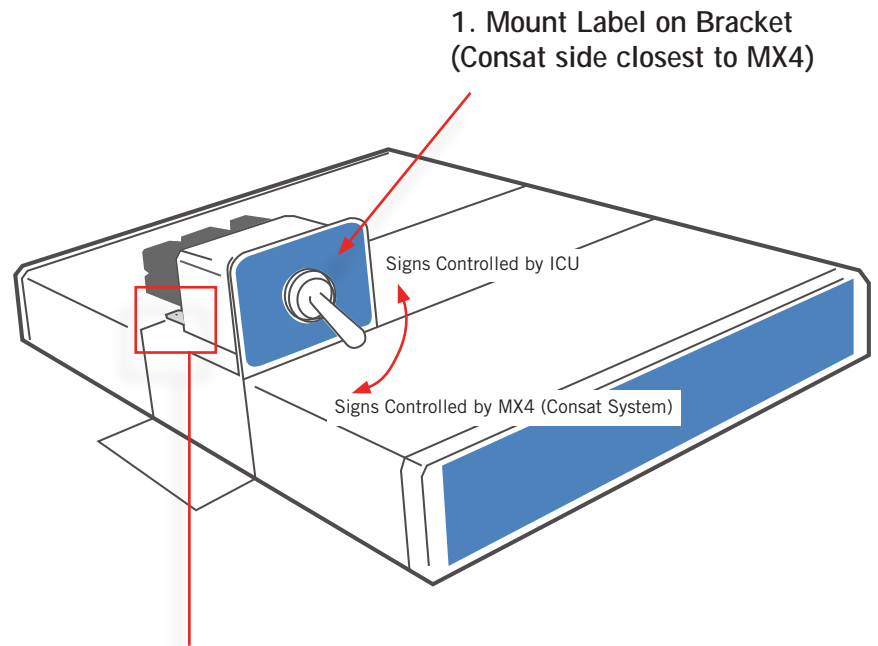
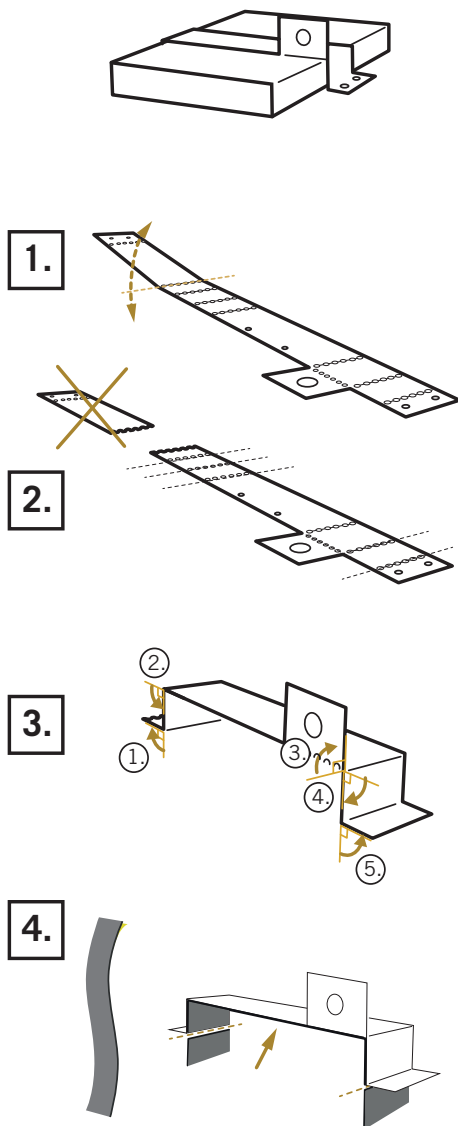


Appendix 4: MX4 Mounting Bracket, Folding Instructions

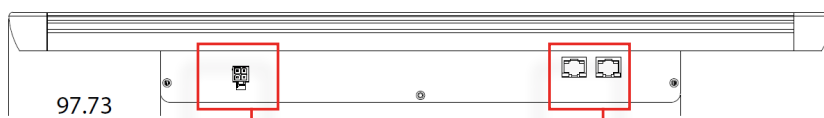
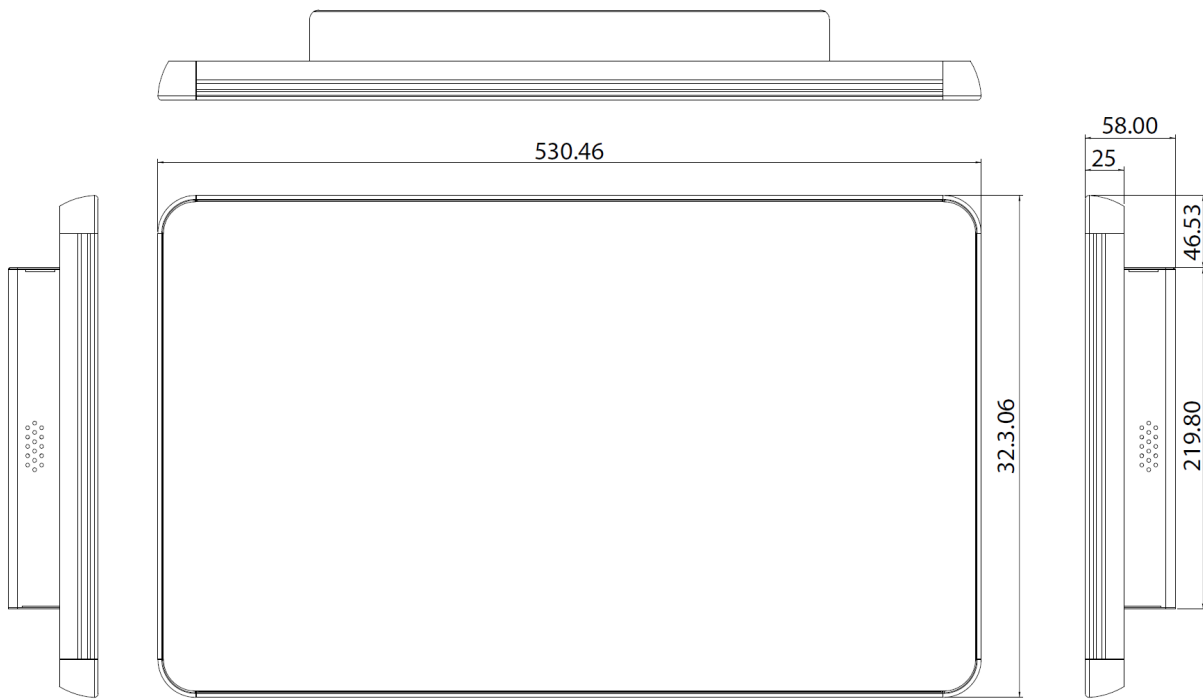


Appendix 5:

Sign control switch and label, mounted on bracket



Appendix 6: Passenger Display: Dimensions, Connections



PWR Connector

LAN/Rx/Tx Ports:

Master Display: LAN, Tx ports
(sending image to slaves)

Slave Display: Rx (recieve im-
age), Tx (Transmit image to next
daisy chained slave).

