

MCS

Monitoring Case System for sensor and IoT/IIoT applications

Application note 111395 en 00

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1 Description

The MCS housing series is suitable for sensor and IoT/IIoT applications in the industrial sector. The housings made of reinforced polyamide are available with IP65/IP67 and IP40 degree of protection. For both degrees of protection, the housings are available in three sizes.

The housing can be screwed directly to a wall using the elongated holes in the lower housing part. There are additional mounting options via an adapter plate:

- Wall mounting
- Mast mounting
- Mounting on a mounting profile
- DIN rail mounting
- Mounting on a flush-type socket

Frames are available in various colors and versions for the upper housing part. The frame offers coding and marking options. It protects integrated control panels by means of a recessed front and transparent covers.

Via living hinges, you can connect the housing parts to each other so that they are non-detachable. This makes maintenance work easier.



Observe these notes

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This document is valid for the products listed in Section "Ordering data" on page 4.

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2 Overview of MCS products



Housing, 2-part, in three sizes, with IP40 or IP65/IP67 degree of protection, with screws for housing screw connection and four PCB screws



Frame, for covering the screws, with marking field, coding by means of various colors



Frame with transparent latching cover (non-detachable), for covering the screws, with marking field, in various colors, for protecting underlying displays

Frame with transparent hinged cover, for covering the screws, with marking field, in various colors, to protect underlying displays and membrane keypads



The complete product list for the housings of the MCS series can be found at phoenixcontact.com, web code: #3462.



Adapter plate, for mounting

- On a wall
- On a pipe or mast (horizontal and vertical)
- On a mounting profile (horizontal and vertical)
- On a DIN rail
- On a flush-type socket

Living hinge, for connecting the lower housing part, upper housing part, and frame so that no part is lost during maintenance

PCB screws, for installing a second PCB in the housing. You can also use these screws to connect the housing to the adapter plate.

3 Ordering data

A configurator for selecting the products is available at phoenixcontact.com, web code: #0512. You can use it to configure your housing. You will then receive 3D data, order lists, and PCB layouts.

3.1 Order key

The designation of MCS series electronics housings consists of the following components:

Housing



MCS - 78	X 64	X 42	- IP40	- 7035
Width (w)	Height (h)	Depth (d)	Degree of protection	Color
78 mm	64 mm	42 mm	IP40 = degree of protection: IP40	7035 = similar to RAL 7035
112 mm	90 mm	52 mm	IP6X = degree of protection: IP65	
156 mm	127 mm	65 mm	and IP67	

Frame

MCS - 78	X 64	- C	- D	- 7035
Width (w)	Height (h)	Frame	Function	Color
78 mm	64 mm		D = frame	7035 = similar to RAL 7035
112 mm	90 mm		L = frame with transparent,	9005 = similar to RAL 9005
156 mm	127 mm		securely latched cover	5015 = similar to RAL 5015
			S = frame with transparent hinged cover	1018 = similar to RAL 1018

1524149

Adapter plate

MCS - 78	X 64	- AP	- 7035
Width (w) 78 mm 112 mm 156 mm	Height (h) 64 mm 90 mm 127 mm	Adapter plate	Color 7035 = similar to RAL 7035
Accessories Living hinge		MCS-H-40-3031	1524154

Living hinge	MCS-H-40-3031
PCB screws	MCS-S-PCB-2,5X8

Туре	Item designation	RAL	Dimensions width x height x depth [mm]		
			78 x 64 x 42	112 x 90 x 52	156 x 127 x 65
Housing	MCSIP40	7035 ¹	1523800	1524058	1524052
	MCSIP6X	7035 ¹	1524047	1524044	1524038
Туре	Item designation	RAL	Dimens	sions width x heig	ht [mm]
			78 x 64	112 x 90	156 x 127
Frame	MCSC-D	7035 ¹	1524240	1524256	1524266
		9005 ¹	1524241	1524257	1524267
		5015 ¹	1524243	1524260	1524268
		1018 ¹	1524244	1524261	1524272
	MCSC-L	7035 ¹	1524411	1524482	1524412
		9005 ¹	1524414	1524432	1524416
		5015 ¹	1524693	1524418	1524428
		1018 ¹	1524422	1524479	1524481
	MCSC-S	7035 ¹	1524435	1524426	1524438
		9005 ¹	1524413	1524424	1524474
		5015 ¹	1524478	1524484	1524477
		1018 ¹	1524419	1524431	1524476
Adapter plate	MCSAP	7035 ¹	1524155	1524160	1524150
Туре	Item designation	RAL			
Living hinge	MCS-H-40	3001 ¹		1524154	
PCB screws ²	MCS-S-PCB-2,8X8			1524149	

3.2 Product list of the housing parts

¹ Color similar to the specified RAL color

 $^2\;$ 1 set of PCB screws is supplied as standard with the housing

1 Other color versions are possible.

4 Technical data

Housing design				
Insulation material group	CTI 600			
Housing, frame, adapter plate	Polyamide PA w	ith 30% GF		
Transparent cover	Polycarbonate F	°C		
Seal	TPE			
Living hinge	Polypropylene F	P		
Flammability rating in accordance with UL 94				
Housing, frame, adapter plate	V0			
Transparent cover	V0			
Seal	НВ			
Living hinge	НВ			
Degree of protection in accordance with DIN EN 60259				
Housing	IP40			
Housing with seal and pressure compensation element	IP65 and IP67			
Degree of protection in accordance with NEMA-250				
Housing with seal and pressure compensation element	6			
Impact strength in accordance with DIN EN 50102				
MCS-78X64X42	IK07			
MCS-112X90X52	IK07			
MCS-156X127X65	IK07			
Temperature range	_			
Ambient temperature	1000			lite of 000/
Storage/transport	-40°C +55°C,	at a maximui	m numic	lity of 80%
Mounting	-5°C +85°C			
Operation	-40°C +85°C			
Mounting	Housing		РСВ	
Housing				
Tightening torque	2.2 Nm 2.5 Ni	n	0.5 Nm	
Speed	500 min ⁻¹			
Bit	Torx 20		Torx 7	
PCB				
PCB surface, maximum per PCB, single side	2680 mm² 15	500 mm²		
PCB thickness	Maximum 1.8 m	m		
Mounting, maximum weight	Wall		Adapte	r plate
MCS-78X64X42	250 g 250 g			
MCS-112X90X52	500 g 500 g			
MCS-156X127X65	1200 g		1200 g	
			-	
Recommended screws	Diameter	Head diame	eter	Head height
wait mounting (direct)	≤4.0 mm	≤9.2 mm		-
waii mounting (with adapter plate)	≤6.0 mm	≤13.2 mm		≤7.8 mm
Flush-type socket (with adapter plate)	≤3.0 mm	≤5.8 mm		≤1.5 mm
Mounting profile (with adapter plate)	≤6.0 mm	≤13 mm		≤8 mm

Tests	
Vibration test	DIN EN 60068-2-6
Shocks	DIN EN 60068-2-27
Thermal stability (ball thrust test)	DIN EN 60695-10-2
Test for assessing the risk of fire (glow wire)	DIN EN 60695-2-11
Test for substances that would hinder coating with paint or varnish	VDMA 24364-A1

4.1 Power dissipation diagrams

The power dissipation diagrams show the power dissipation in relation to the temperature difference between the housing and the environment. This allows you to roughly identify an area at the beginning of a development process in which the thermal operating point of a device is later located.

For the diagrams, the heat flows of the housings that can be dissipated are determined based on four load cases. The comparison of the load cases shows the influence of the housing on the theoretical maximum rate of heat flows that can be dissipated.





Boundary conditions for determining the power dissipation

- Consideration of the individual housing sizes
- Mounting position: rounding of the housing facing upwards; wall mounting, freely installed in the room
- PCB in the lower housing part

Load case 1: concentrated temperature source on the PCB in the housing

Load case 2: homogeneous, large-surface temperature



5 Housing dimensions

5.1 External and inner dimensions





a	b	С	d	е	f	g
78 mm	64 mm	42 mm	36.1 mm	4.5 mm	9 mm	23.1 mm
112 mm	90 mm	52 mm	46.1 mm	5.8 mm	10.5 mm	31.6 mm
156 mm	127 mm	65 mm	57.1 mm	7.5 mm	11.5 mm	43.1 mm

1 PCB thickness = 1.8 mm, max.

5.2 Space for marking and cutouts



Figure 5 Maximum space for marking and cutouts for MCS-78X64X42-...

Figure 6 Maximum space for marking and cutouts for MCS-112X90X52-...



1 Area for machining

2 Marking area

Z1/Z2: zero point of the workpiece for milling Tolerance for machining: DIN ISO 2768-1 mK Tolerance for marking: DIN ISO 2768-1 m Machining radius at least R1, others on request



Figure 7 Maximum space for marking and cutouts for MCS-156X127X65-...

- **1** Area for machining
- 2 Marking area

Z1/Z2: zero point of the workpiece for milling Tolerance for machining: DIN ISO 2768-1 mK Tolerance for marking: DIN ISO 2768-1 m Machining radius at least R1, others on request

5.3 PCB dimensions



Tolerance for the PCB

- Dimensions ≤30: ±0.10 / R ±0.2 / ±1°
- Dimensions >30: ±0.15 / R ±0.2 / ±1°

Symmetry: 0.2

PCB thickness = 1.8 mm, max.

Bore holes for screws for MCS-S-PCB-2,8X8 (1 set of PCB screws included in the scope of supply of the housing)

6 Mounting the housing

6.1 Mounting the PCB

Figure 9 Mounting the PCB

- Push the PCB into the lower housing part. If the connection technology is pre-assembled, insert it into the feed-through holes.
- Screw the PCB to the four screw bosses using the included screws (MCS-S-PCB-2,8X8) with 0.5 Nm.
 We recommend a torque screwdriver with a T7 bit (500 rpm).

If possible, tighten the four screws crosswise.

You can attach a PCB to the upper housing part in the same way.

6.2 Fastening the housing

Figure 10 Fastening the housing



Use the self-tapping T20 Torx screws provided to attach the housing. We recommend a torque screwdriver with a T20 bit.

The screws are designed in such a way that they cannot be lost when the cover is released.



The housing can be opened for a maximum of 10 times.

• Fasten the upper housing part with 2.2 Nm ... 2.5 Nm.

6.3 Mounting the frame

The frame is available in three versions.

- MCS-...-C-D-...
- Frame

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- MCS-...-C-L-...

Frame with transparent latching cover (non-detachable)

– MCS-...-C-S-...

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Frame with transparent hinged cover

The recess on the frame is used for marking with labels.

If you are using a frame with latching or hinged cover, you must first attach the cover to the frame.

- "Snapping on the latching cover" on page 15
- "Snapping on the hinged cover" on page 15

Figure 11 Snapping on the frame



• Push the frame onto the housing until you can hear that it has latched.



 To release the latching on the frame, use a bladed screwdriver for removal. Then you can remove the frame.

6.3.1 Snapping on the latching cover

Figure 13 Snapping on the latching cover



- Insert the latching cover before mounting the frame.
- Place the frame on a suitable surface.
- Insert the latching cover into the frame from the rear. Snap the latching cover into both openings and fold it down.

6.3.2 Snapping on the hinged cover

Figure 14 Snapping on the hinged cover



- Insert the hinged cover before mounting the frame.
- Place the frame on a suitable surface.
- Insert the hinged cover into the frame from the front. Snap the latching cover into the two openings at the back of the frame and fold it down.

You can open the hinged cover until you feel a resistance. The cover stays in that position and does not fold down.

6.4 Fitting the living hinge

After mounting the housing, you can integrate the optional living hinge. To ensure that no part is lost during maintenance, the living hinge connects the lower housing part, the upper housing part, and the frame.

Figure 15 Fitting the living hinge



Only mount the living hinge once the three housing components have been mounted (upper part, lower part, and frame).

- Place the housing with the lower part facing upwards on a clean work surface.
- From the rear, push the living hinge into the opening of the lower part. The living hinge has an arrow to show the right direction.

When the living hinge has latched twice, it is correctly positioned.

6.5 Seal

Sealing with a wire is possible at two points to protect against unauthorized access.

• Guide the wire through the opening in the upper housing part until the wire appears in the opening in the lower part.

Figure 16 Seal



6.6 Pressure compensation element for MCS...-IP-6X...

The housing versions with IP6X feature an additional seal and a pressure compensation element. The pressure compensation element is integrated in the lower housing part and stands out due to its yellow color.



NOTE:

Make sure not to damage the pressure compensation element. Do not cover the ventilation holes.

7 Attaching the housing

7.1 Mounting the housing on a wall

Observe the maximum permissible total weight (see "Mounting" on page 6).

Figure 17 Wall mounting



- Remove the frame using a bladed screwdriver (see Figure 12).
- Screw the housing directly to the wall using the elongated holes in the lower housing part.

Recommended screws for wall mounting:

Diameter Head diameter 4 mm, maximum 9.2 mm, maximum

Drilling diagram

Figure 18 Drilling diagram for MCS-78X64X42







Figure 20 Drilling diagram for MCS-156X127X65



7.2 Mounting the housing using an adapter plate

7.2.1 Mounting types of the adapter plates

- Attach the adapter plate to the desired medium.
 - Wall mounting
 - Mast mounting
 - Mounting profile
 - DIN rail mounting
 - Flush-type socket

To identify which mounting type is possible, please refer to "Adapter plate dimensions" on page 21.

Wall mounting

Screw the adapter plate to a wall.

Suitable screws:	
Diameter	6 mm, maximum
Head diameter	13.2 mm, maximum
Head height	7.8 mm, maximum

Mast mounting





Attach the adapter plate to a mast using clamps. This mounting type is suitable for a mast diameter of 15 mm ... 200 mm.

The clamps can be attached horizontally or vertically to the adapter plate.

The clamp width depends on the housing size:

MCS-78X64X42	15 mm, maximum
MCS-112X90X52	16 mm, maximum
MCS-156X127X65	20 mm, maximum

Mounting profile

Figure 22 Example for mounting profile



Attach the adapter plate to a mounting profile. The adapter plate can be attached horizontally or vertically.

Suitable screws:

Diameter Head diameter Head height 6 mm, maximum 13 mm, maximum 8 mm, maximum

DIN rail mounting

- Snap the adapter plate onto an NS 35 DIN rail.
- Release the adapter plate with minimal force. The release point is marked with a screwdriver symbol on the adapter plate. Use a screwdriver with a blade width of at least 3.5 mm (SZF 1-0,6X3,5, 1204517 or SZF 2-0,8X4,0, 1204520).

Figure 23 DIN rail mounting: release



Flush-type socket

Screw the adapter plate to a flush-type socket.

Suitable screws Diameter Head diameter Head height

3 mm, maximum 5.8 mm, maximum 1.5 mm, maximum

7.2.2 Mounting the housing on the adapter plate

- Snap the housing onto the adapter plate. When the housing is pressed onto the adapter plate, the locking clips snap into the elongated holes of the housing.
- There are two slots on the sides of the adapter plate for **removal**. Insert a screwdriver into the slot to lever the housings off the adapter plate.



You can snap the housing onto the adapter plate for a maximum of 10 times.

Optional: connecting the housing permanently to the adapter plate

You can permanently connect the housing to the adapter plate.

• To do this, screw the PCB screws (MCS-PCB-2,8X8) into the locking clips from the front (**5** in Figure 24 to Figure 26).

Screwing in spreads the locking clips and ensures a secure connection.

Once the screws are screwed in, it is no longer possible to remove the adapter plate.

7.2.3 Adapter plate dimensions

Figure 24 MCS-78X64-AP-... adapter plate



Figure 25 MCS-112X90-AP-... adapter plate



- **1** Screw holes for wall mounting and mounting profile
- 2 Slots for the clamps for mast mounting
- **3** DIN rail mounting
- 4 Mounting on a flush-type socket
- 5 Locking clip (see "Optional: connecting the housing permanently to the adapter plate" on page 20)



- **1** Screw holes for wall mounting and mounting profile
- 2 Slots for the clamps for mast mounting
- **3** DIN rail mounting
- 4 Mounting on a flush-type socket
- **5** Locking clip (see "Optional: connecting the housing permanently to the adapter plate" on page 20)

8 Accessories and customization

8.1 Tools

Torx screws are used to fasten the upper housing part. A bladed screwdriver is required to release the covers or the housing from the adapter plate.

Phoenix Contact offers tools:

- Screwdriver set, Torx, incl. TX 10x80 SF-TXH SET, 1212538
- Bit screwdriver set with quick-action chuck, slotted, crosshead, Hex, and Torx bits
 SF-M SET, 1212543

8.2 Housing customization

Customer-specific solutions are available in addition to the standard range.

- Color versions
- Markings using different printing technologies
 - Pad printing: ideal for single-color or two-color printing
 - Screen printing: for multi-color markings on larger surfaces
 - Laser marking: particularly suitable for content that changes on a regular basis, e.g., serial numbers
 - Digital printing: photorealistic designs and color gradients, even for small quantities
- Mechanical processing of the housing parts
- **1** Further information can be found under web code #0685.

8.3 Configurator

A configurator for selecting the products is available at phoenixcontact.com, web code: #0512. You can use it to configure your housing. You will then receive 3D data, order lists, and PCB layouts.