mec
switches

switches

Switch Engineering Catalogue No. 6

mec Competences

Since its foundation in 1938, mec has been making state-of-the-art electromechanical components.

Today we are focusing on continuous innovation to maintain our position as leader in the segment of high end PCB mount push button switches. By always choosing the best possible solution, whether it is a design principle, a material or a manufacturing process we maintain and improve our sustainable high quality level. With this approach a wealth of know-how has been built up over the years for the benefit of new product development and custom solutions.

Despite the trend of outsourcing it has been the policy of mec to maintain a high degree of vertical integration that enables us to react promptly on specific customer requests. Only processes that are not considered core competences have been outsourced.

Research and Development

Equipped with the latest CAD solutions with 3D facilities and optical simulation software our experienced R&D engineers are designing, simulating and evaluating new products and machinery continuously.
The combination of a strong R&D facility and the vertical integration enables us to provide custom designs from conception to completion.

Automation - Tooling - Moulding - Stamping - Graphics Marking - Custom Assembly

All switch modules are manufactured on fully automated production lines with complete in-line component tests. All production statistics are analysed and stored in computers. 98% of all parts used in the mec switches are produced in-house.

Ongoing investments ensure that latest technology is available for the tooling department. However, at mec we believe that the most important factors for maintaining a high tool standard are the outstanding skills and experience of our toolmakers.

Prompt reaction to customer requests has always been important to mec.

The plastic moulding department consists of numerous moulding machines. Rigorous process control ensures the highest possible precision and reproduceable quality that is essential for making precision components.

All metal parts are manufactured in our metal stamping department. When making contact elements, a computer controlled test station provides a high level of repeatability and secures that any required corrections can be made instantly.
Graphics marking is also made in-house to secure constant quality and durability of both standard and customized graphics for the many keycaps and bezels available.
The assembly department offers all kinds of value-added services such as customized final assembly made by experienced and quality conscious personnel.

Logistics and Production Planning

The production planning software is today fully integrated into the financial and administrative system.
The system provides the backbone that allows us to maintain precise deliveries and to offer excellent customer service.

Quality – Environment - RoHS

We strive to maintain the highest possible quality standard through our QA system. With 100% in-line inspection, tight tolerance on all parts and use of only quality material we position ourselves to reach the highest achievable.
To be a part of a sustainable industrialized world environmental consciousness is crucial. At mec we have been substituting materials to more environmental friendly alternatives and are recycling as much as possible. Legal authorities are auditing our environmental management system regularly and confirming that our goal is being reached.

RoHS conversion has been completed for all switches. To manage the inventory in the complete supply chain a separate part number system has been established. All parts manufactured today are RoHS compatible.

Sales - Customer Service - Distribution

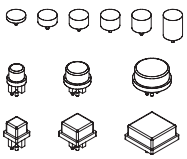
mec have a well established global distribution network that provides a presence in all parts of the world where electronic manufacturing takes place. Through close contact and continuous product training offered to our distributors we maintain a highly qualified and responsive global distribution network
Please contact mec or one of our distributors if you require assistance or samples to complete your new design with mec switches. We welcome inquiries also for custom solutions.

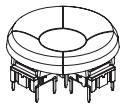
For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® PCB Mount Pushbutton Switches

mec specializes in the production of PCB mounted pushbutton switches. Our products are designed to be used in a wide variety of applications. Through the use of a modular approach to switch assembly the user is provided with a unique flexibility in his choice of options. multimec® switches are known for their crisp audible tactile feel although a “quiet” model is available for sensitive applications such as audio and conference equipment.
The multi-coloured keycaps, bezels and LEDs snap together to produce almost unlimited switch configurations. Customized keycaps and bezels can be manufactured for special applications.

3A/4A Switches					Caps and Bezels	Page
Pushbutton		Illuminated				
TH	SMD	TH		SMD		
 3AT	 3AS	 3AT	 4AT	 4AS		
X	X				 1M  1ZA	11
		X	X	X	 1H	11/09
					 1C +  2A/2C	10/09
X	X	X	X	X	 1A	11/09
					 1B +  2A/2C	10/09
					 1B +  2B/2D + 2B LED	10/09

3C/3E Switches				Caps and Actuators	Page
Pushbutton					
TH		SMD			
 3CT	 3ET	 3CS	 3ES		
X		X			27
	X		X		27 28 29

Navimec™ Switches					Caps	Page
Pushbutton			Illuminated			
TH		SMD	TH	SMD		
 3AT	 3FT	 3AS	 4FT	 4FS		
X		X			 1ZB 	12/13
	X		X	X	 1ZC	

The size of the switches, caps, actuators and bezels listed may not correspond to the actual size.

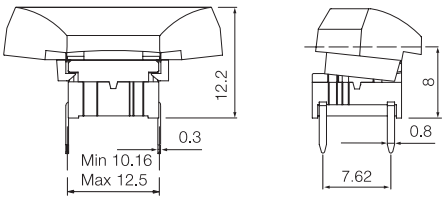
For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® Navimec™

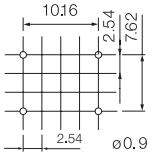
Technical Data

- through-hole or SMD
- 50mA/24VDC
- single pole/momentary
- 10.000.000 operations life time
- IP67 sealing
- temperature range:
  low temp: -40/+115°C
  high temp: -40/+160°C

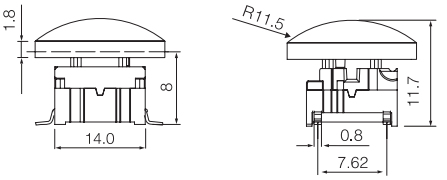
Dimensions 1ZB (through-hole)



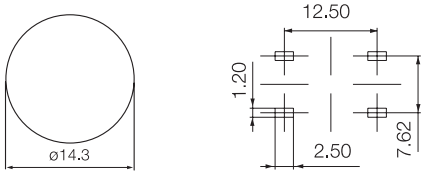
PCB layout



Dimensions 1ZC (SMD)



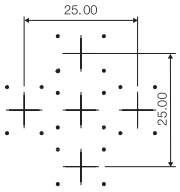
PCB layout



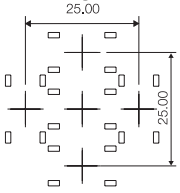
Recommended panel cut-out:

ø35.0-35.5 Depending on application

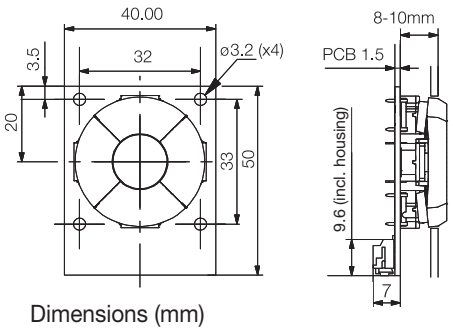
PCB layout TH



PCB layout SMD



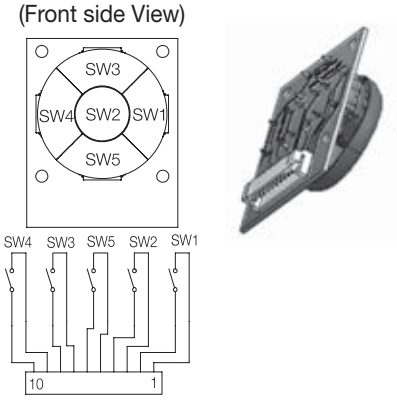
Dimensions Navimec™ Module



Dimensions (mm)

Circuit Diagram Navimec™ Module

(Front side View)



The plug on the Navimec™ module is JST SMT S10B-PH-SM3-TB or similar.
We recommend using
Cable socket: JST PHR-10 or similar
Contact: JST SPH-002T-PO.5S or similar.

How to order

3 A				
Switch	**Mounting** **T** through-hole **S** surface mount	**L 6** low temp. **H 9** high temp.	**Cap 1ZB**	**03** grey **06** white **09** black **30** ultra blue **40** dusty blue **42** aqua blue **50** metal dark blue **53** metal light grey **57** metal dark grey **58** metal bordeaux
3 F				
Switch	**Mounting** **T** through-hole **S** surface mount	**L 6** low temp. **H 9** high temp.	**Cap 1ZC**	

Navimec™ Module

Part No. 9508000	**Navimec™ Module excl. keycaps**
Part No. 950XXYY	**Navimec™ Module incl. keycaps**
Part No. 9509XXXYYY	**Navimec™ Module incl. keycaps with legends**

The module can be delivered with keycaps (4 x 1ZB and 1 x 1ZC) in solid colours or black keycaps with white legends.
For module incl. keycaps in solid colours (950XXYY) please indicate colour code for 1ZBXX and colour code for 1ZCYY.
For module incl. keycaps with legends (9509XXXYYY) please indicate legends for 1ZBXXX and legends for 1ZCYYY. All Caps are black with white legends. Please see legends available on page 23.

Examples: Module with 5 switches (4x3ATL6+1x3FTL6) mounted with 4x1ZB30 ultra blue and 1x1ZC42 aqua blue = 9503042.
Module with 5 switches (4x3ATL6+1x3FTL6) mounted with 4x1ZB09XD136 (legend arrow) and 1x1ZC09118 (legend OK) = 9509136118.

Ordering example: 4x3ATL6+1ZB53 and 1x3FTL6+1ZC58 or Navimec™ Module 9505358

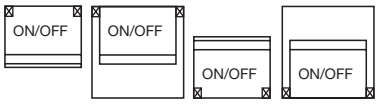
For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® Legends

All standard legends are white on black caps.
The size of the legends listed may not correspond to the actual size.
Please ask your local distributor, if you do not find what you need on the list. New legends may have been added after this catalogue was printed.
Custom legends and other colour combinations are available, please contact your local distributor.

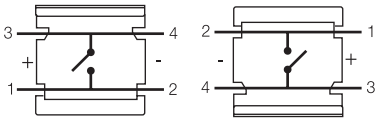
Note!

Position of Cap 1A/1B



UP 1A09XU | UP 1B09XU | DOWN 1A09XD | DOWN 1B09XD

Orientation of Switch for 1A/1B



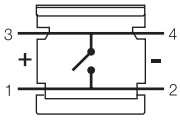
UP DOWN

For 1A/1B the orientation shown above is standard.

Please consider the switch orientation you require before specifying legend orientation.

Position of Cap 1D/1F

Orientation of Switch for 1D/1F



For the 1D and 1F caps the orientation shown above is standard.

Please consider the switch orientation you require before specifying legend orientation.

Standard Keycap Legends

	Part no.							
						 Reverse Print		
LEGEND	**1A09XU_**	**1A09XD_**	**1B09XU_**	**1B09XD_**	**1D09_**	**1F096_**	**1ZB09XD_**	**1ZC09_**
0	000	000	000	000	000	000		
1	001	001	001	001	001	001		
2	002	002	002	002	002	002		
3	003	003	003	003	003	003		
4	004	004	004	004	004	004		
5	005	005	005	005	005	005		
6	006	006	006	006	006	006		
7	007	007	007	007	007	007		
8	008	008	008	008	008	008		
9	009	009	009	009	009	009		
A	010	010	010	010				
B	011	011	011	011				
C	012	012	012	012				
D	013	013	013	013				
#	107	107	107	107	107	107		
*****	019	019	019	019	019	019		
⌑	016	016	016	016				
→	033	033	033	033	033			
←	133	133	133	133	133			
↑	034	034	034	034	034			
↓	134	134	134	134	134			
↵	135	135	135	135	135	135		
+	054	054	054	054				
–	059	059	059	059				
•	056	056	056	056				
▲							136	
⏻	123	123	123	123	123	123		123*
START	031	031	031	031				
CLEAR	036	036	036	036				
LOAD	037	037	037	037				
RESET	038	038	038	038				038
CANCEL	048	048	048	048				
ENTER								105
OK								118
SET								119
MENU								120
FUNC								121
HOME								122

* 1ZC16 for illumination

For updates of products and/or changes of specifications please see **www.mec.dk**

Applications with mec switches

Studio Equipment

Navimec, 3A+1ZA

Security Access Control

Navimec,3A+1B+2A,3A+1A

Digital Microscope

3F+1D

Barcode Reader

3C in-moulded

Pump Control Unit

3E

Space Shuttle Internal Communication

Unimec 15501+16300+16310

Control for Video Camera in Police Cars

3A+1A, 1H

Conference Systems

3F+1ZA,1ZC 3A+1H,1M

Door Entry Control

3F+1T,1U,1V,1F

For updates of products and/or changes of specifications please see **www.mec.dk**

Applications with mec switches

Police Speed Control

3F+1D, 1T, 1V

Control Panel for Boats

3F+1U

Scooter for Disabled People

3F+1D

Defillibrator

3C under foil

Tree Felling Equipment

3E

Flight Simulators

3F+1P 3F+1P,1D

Military Handheld Computer

3C

Car Operation Panel for Disabled People

3F+1ZA, 1ZC Navimec, 3F+1ZC

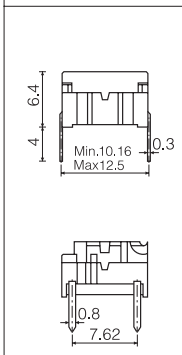
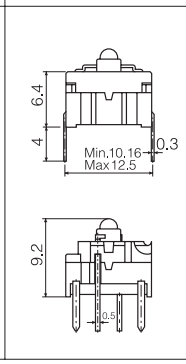
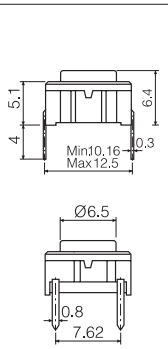
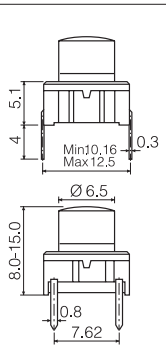
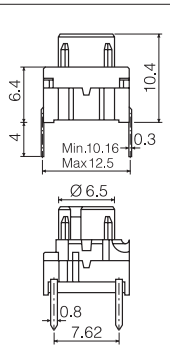
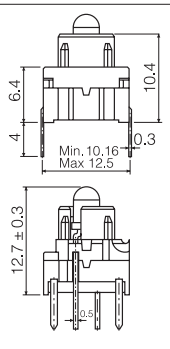
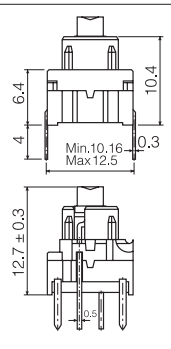
Mixing Console

3F+1K,1E

For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® basic switch modules

Through-hole Versions

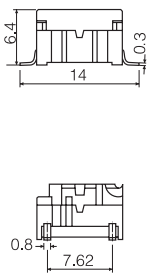
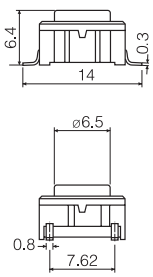
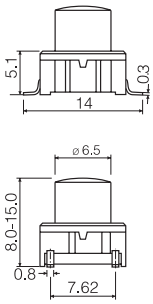
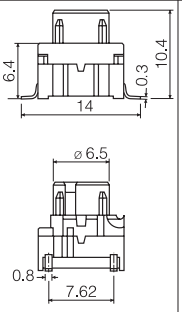
3A		3C	3E	3F		
For 1A/1B/1M/1ZA/1ZB	w/LED for 1C/1H		For 3E actuators/Varimec	For 1D/1K/1N/1P/1S/1T/ 1U/1V/1WA/1WD/1WG/ 1WP/1X/1ZC/1GA/1GC	w/LED for 1D/1E/1F/1N/1Q/1R/ 1S/1X	w/LED for 1K /1KB/1KC/1T/1U/1V/ 1WA/1WD/1WP
						

Standard Versions						
3ATL6 3ATH9	3ATL600/20/40/80	3CTL6/3CTL9 3CTH9	3ETLXX-H* 3ETHXX-H*	3FTL6 3FTH9	3FTL600/20/40/60/80/ 2040/8020/8040	3FTL623/45/88

* 3E available in 6 standard heights: 08.0, 09.5, 10.4, 11.0, 12.0, 15.0 mm. Other heights between 08.0 and 15.0 mm are available upon request.

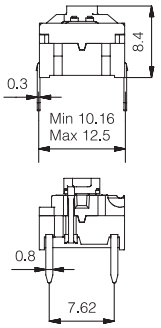
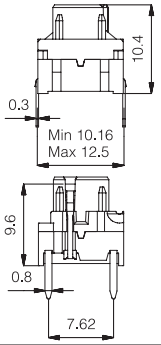
Specials: Gold contacts, quiet version and actuation force other than 3.0N

Surface Mount Versions

3A	3C	3E	3F
For 1A/1B/1M/1ZA/1ZB		For 3E actuators/ Varimec	For 1D/1K/1N/1P/1S/1T/ 1U/1V/WA/1WD/1WP/ 1X/1ZC/1GA/1GC
			

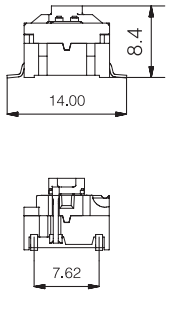
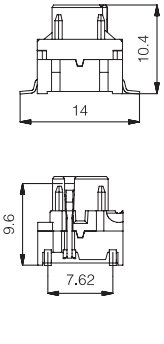
Standard Versions			
3ASH9/3ASH9R	3CSH9/3CSH9R	3ESH9/3ESH9R	3FSH9/3FSH9R

illumec™ Through-hole Versions

4AT w/LEDs	4FT w/LEDs
For 1C/1H	For 1D/1E/1F/1K/1KB/1KC/ 1N/1Q/1R/1S/1T/1U/1V/ 1WA/1WD/1WP/1X
	

Standard Versions	
4ATH901/22/42/61/82/ 2242/8222/8242	4FTH901/22/42/61/82/ 2242/8222/8242

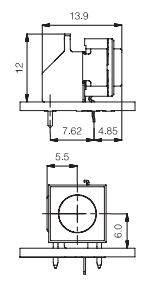
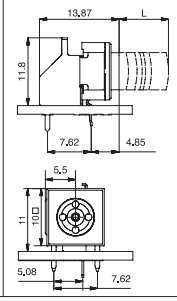
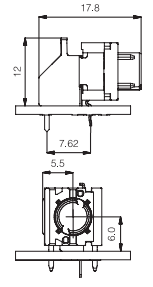
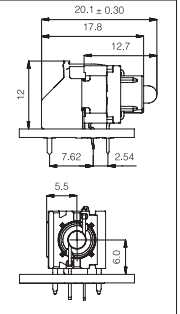
illumec™ Surface Mount Versions

4AS w/LEDs	4FS w/LEDs
For 1C/1H	For 1D/1E/1F/1K/1KB/1KC/ 1N/1Q/1R/1S/1T/1U/1V/ 1WA/1WD/1WP/1X
	

Standard Versions	
4ASH901/22/42/61/82/ 2242/8222/8242	4FSH901/22/42/61/82/ 2242/8222/8242

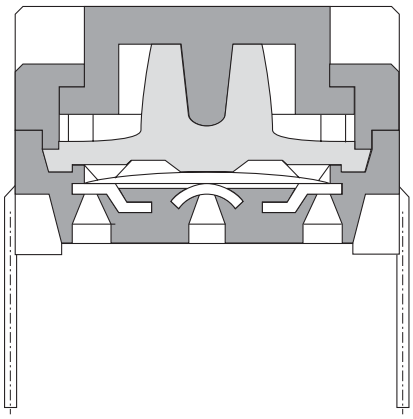
Co-planarity = ≤ 0.05

Right Angle Versions

3C	3E	3F	3F w/LED
	For 3E actuators/ Varimec	For 1D/1K/1N/1P/1S/1T/ 1U/1V/1W/1WA/1WD/ 1WP1X/1ZC/1GA/1GC	For 1D/1E/1F/1N/1Q/ 1R/1S/1X
			

Standard Versions			
3CTL6RAS	3ETXX-X.XRAS	3FTL6RAS	3FTL600/20/40/60/80/ 2040/8020/8040RAS

multimec® Cross Section



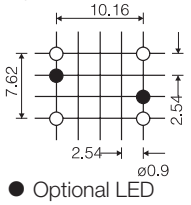
DIMENSIONS (mm) Unless otherwise specified, all tolerances ± 0.2

For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® basic switches and tape & reel

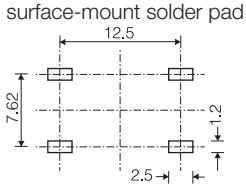
Recommended PCB layout

MULTIMEC®
topview

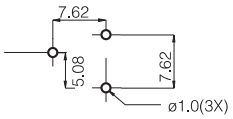


● Optional LED

MULTIMEC®
surface-mount solder pad

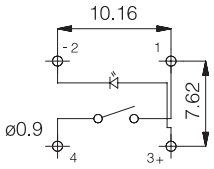


MULTIMEC®
Right Angle Version
topview

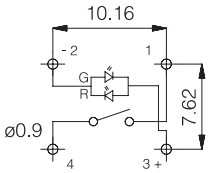


illumec™ PCB and Circuit Diagram

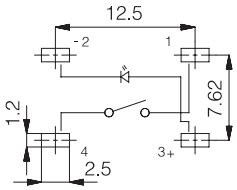
1 LED



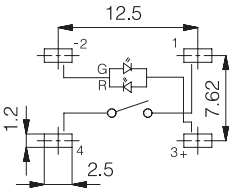
2 LEDS



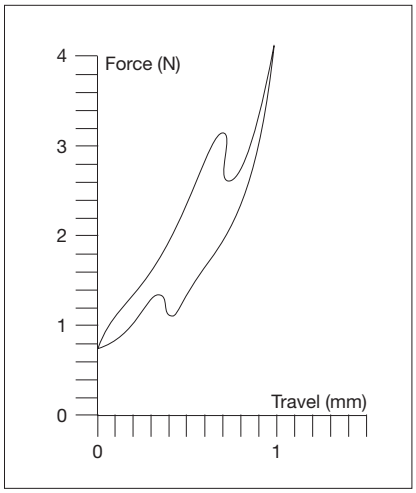
1 LED



2 LEDS



Operating Force
(typical example)



Tape and reel is available for the parts listed and has the following specifications:

Reel diameter	ø330mm
Tape width	24mm
Pitch	see list
Tape and reel material	antistatic or better
Quantity per reel	see list

3A/3C/3E/3F multimec® tape & reel

Part No.	Ordering Code	Pitch	Quantity per reel
3ASH9	3ASH9R	16	500
3CSH9	3CSH9R	16	500
3ESH9	3ESH9R	16	500
3ESH9-08.0	3ESH9R08.0	20	250
3ESH9-09.5	3ESH9R09.5	20	250
3ESH9-10.4	3ESH9R10.4	20	250
3ESH9-11.0	3ESH9R11.0	20	250
3ESH9-12.0	3ESH9R12.0	20	250
All varimec below R after the part no. 12.5		20	250
3FSH9	3FSH9R	20	250

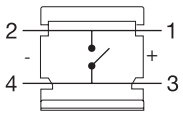
4F illumec™ tape & reel

Part No.	Ordering Code	Pitch	Quantity per reel
4FSH901	4FSH901R	20	250
4FSH922	4FSH922R	20	250
4FSH942	4FSH942R	20	250
4FSH961	4FSH961R	20	250
4FSH982	4FSH982R	20	250
4FSH92242	4FSH92242R	20	250
4FSH98222	4FSH98222R	20	250
4FSH98242	4FSH98242R	20	250

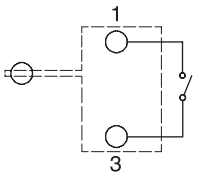
Specifications are according to EIA 600481-3 and IEC 60286-3

Circuit Diagram

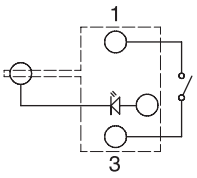
3A-3C-3E-3F



RAS

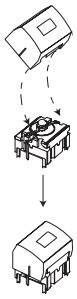


RAS w/LED

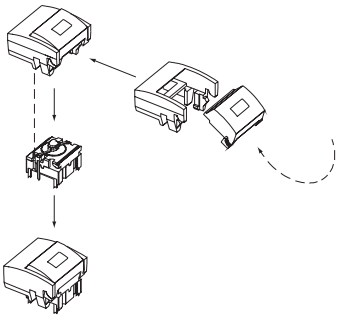


How to Assemble

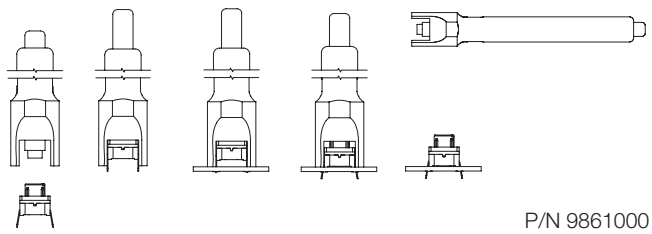
multimec®
3AT + 1A/H + 2A/B



multimec®
3AT + 1B/C + 2A/B



Mounting Tool for Through-hole versions



P/N 9861000

Specifications are subject to change without notice.

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multimec® technical specifications

RoHS Compatible

	3A-3C-3E-3F Low Temperature Versions		3A-3C-3E-3F High Temperature Versions		illumec™ 4A - 4F High Temperature Versions	
	Silver	Gold	Silver	Gold	Silver	Gold
Electrical Specifications						
Contact resistance	<30m Ω - typ. 10m Ω		<30m Ω - typ. 10m Ω		<30m Ω - typ. 10 m Ω	
Insulation resistance	>10M Ω		>10M Ω		>10M Ω	
Recommended load	0.5-50mA 24VDC	0.5µ-50mA 24VDC	0.5-50mA 24VDC	0.5µ-50mA 24VDC	0.5-50mA 24VDC	0.5µ-50mA 24VDC
Contact bounce	<2mS - typically 0.5mS		<2mS - typically 0.5mS		<2mS - typically 0.5mS	
Mechanical Specifications						
Standard actuation force (switch)	3.0N typ.		3.0N typ.		3.0N typ.	
Max. actuation force without cap	100N for 10 sec.		100N for 10 sec.		100N for 10 sec.	
Key travel (switch)	1 mm		1 mm		1 mm	
Life time (switch)	>10.000.000 cycles		>10.000.000 cycles		>10.000.000 cycles	
Temperature Range						
Working temperature	Min. -40°C Max. +115°C		Min. -40°C Max. +160°C		Min. -30°C Max. +85°C*	
Storage temperature	Min. -40°C Max. +115°C		Min. -40°C Max. +160°C		Min. -30°C Max. +85°C*	
Soldering IEC 68-2-20	Wave - max. 260°C for max. 10 sec., please refer to usage guidelines. Soldering iron - max. 350°C for max. 3 sec. Flux tight.		Infrared, vapour phase, wave - max. 240°C for max. 40 sec. or max. 260°C for max. 30 sec. Soldering iron - max. 350°C for max. 3 sec. Flux tight.		Infrared, vapour phase, wave - max. 240°C for max. 40 sec. or max. 260°C for max. 30 sec. Soldering iron - max. 350°C for max. 3 sec. Flux tight.	
Environmental Endurance IEC 68-2-3						
Temperature	+40°C		+40°C		+40°C	
Humidity	93% RH		93% RH		93% RH	
Duration	56 Days		56 Days		56 Days	
Temperature Cycling IEC 68-2-14						
Temperature limit	Min. -40°C - Max. +125°C		Min. -40°C - Max. +125°C		Min. -40°C - Max. +125°C	
Number of cycles	10		10		10	
Exposure time at each temperature	30 min.		30 min.		30 min.	
Recovery time before measurements	16 hrs.		16 hrs.		16 hrs.	
Sealing IEC 529	IP-67		IP-67		IP-67	
Cleaning	Standard methods - see usage guidelines		Standard methods - see usage guidelines		Standard methods - see usage guidelines	
Vibration Test IEC 68-2-6						
Cycles					10	
Cycles time					2 hrs.	
Material Specifications - Switches						
Housing	PBT UL94VO		PPS UL94VO		PPS UL94VO	
Actuator	PBT UL94VO		PPS UL94VO		PPS UL94VO	
Sealing + spring	Silicone rubber		Silicone rubber		Silicone rubber	
Contact spring	Stainless steel + 3µAg	Stainless steel + 1µAu	Stainless steel + 3µAg	Stainless steel + 1µAu	Stainless steel + 3µAg	Stainless steel + 1µAu
Fixed contacts	SnCu + 2µNI + 3µAg	SnCu + 2µNI + 1µAu	SnCu + 2µNI + 3µAg	SnCu + 2µNI + 1µAu	SnCu + 2µNI + 3µAg	SnCu + 2µNI + 1µAu
Terminals	SnCu + 2µNI + 3µSn100	SnCu + 2µNI + 3µSn100	SnCu + 2µNI + 3µSn100	SnCu + 2µNI + 3µSn100	SnCu + 2µNI + 3µSn100	SnCu + 2µNI + 3µSn100

Material Specifications - Caps & Bezels			
Material	**Parts**	**Temp limit**	**UL rating**
ABS	1A, 1B, 1C, 1D, 1E, 1F, 1H, 1K, 1M, 1N, 1P, 1Q, 1R, 1T, 1U, 1V, 1WA, 1WD, 1WP, 1X, 1ZA, 1ZB, 1ZC.	Max. 65°C	UL94HB
Polycarbonate	All lenses, 3E coloured actuators	Max. 85°C	UL94V1
LCP	Black actuator of 3E	Max. 160°C	UL94VO
PPS	1S, 2S	Max. 160°C	UL94VO
Polyamide	Actuator of Varimec™, 1GA/1GC	Max. 160°C	UL94VO
Legends Adhesion	ISO Class: 1/ASTM Class: 4B DIN EN ISO 2409		

* LED max. working temperature

Specifications are subject to change without notice.

For updates of products and/or changes of specifications please see **www.mec.dk**

multimec® LEDs

For 3A switches		3AXXX (for 1C/1H)				2BXXX			
Colour		**B**	**G**	**Y**	**R**	**G**	**Y**	**R**	
Colur Codes		00	20	40	80	20	40	80	
Absolute Maximum Ratings	(Ta=25°C)								
Power	mW	105	100	60	100	75	60	60	
Current forward	mA	30	30	20	30	20	20	20	
Forward peak current	mA	150	120	80	120	60**	60**	60**	
Voltage reverse	V	5	5	5	5	3	3	3	
Operating temperature	°C	-40 - +85	-55 - +100			-25 - +85			
Storage temperature	°C	-40 - +85	-55 - +100			-30 - +100			
Soldering temperature	°C	260/5 sec.	260 for max. 3 sec.			260 for max. 5 sec.			
Electrical-Optical Characteristics	(Ta=25°C)								
Voltage forward	Typ. V	3.8	2.1*	2.1*	2.0*	2.1	2.1	2.0	
	Max. V	4.5	2.8*	2.8*	2.8*	3.0	3.0	3.0	
Current reverse (V_R = 5V)	µA	10	100	100	100	10	10	10	
Wave length	nm	466	565	585	630	563	585	650	
Spread	Δnm	30	30	35	40	40	40	40	
Spread angle	degree	40	90	90	90	45	45	45	
Luminous Intensity	Min. mcd	4	0.7	1.7	1.1	9.0	5.6	5.6	
	Typ. mcd	10	2.5	5.6	3.7	25	16	16	
Orientation	The longer pin is the anode, the shorter is the cathode								

*/$_F$ = 20mA, **Pulse width 1ms Duty cycle 1:5

For 3F switches		3FXXX (for 1E-1F-1N-1Q-1R-1S-1X)							3FXXX (for 1K-1T-1U-1V-1W-1WD)		
Colour		**B**	**G**	**Y**	**R**	**G/Y**	**R/G**	**R/Y**	**G**	**Y**	**R**
Colur Codes		00	20	40	80	2040	8020	8040	23	45	88
Absolute Maximum Ratings	(Ta=25°C)										
Power	mW	105	70	60	60	120	120	120	150	130	300
Current forward	mA	30	20	20	20	25	25	25	40	40	90
Forward peak current	mA	200	60**	60**	60**	150	150	150	500	500	1000
Voltage reverse	V	5	3	3	3	5	5	5	12	12	5
Operating temperature	°C	-25 - +85				-40 - +85			-55 - +100		
Storage temperature	°C	-30 - +100				-40 - +85			-55 - +100		
Soldering temperature	°C	260 for max. 5 sec.				260 for max. 2 sec.			300 for max. 3 sec.		
Electrical-Optical Characteristics	(Ta=25°C)										
Voltage Forward	Typ. V	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1*	2.3***	2.4***
	Max. V	2.8	3.0	3.0	3.0	2.8	2.8	2.8	2.5*	2.5***	3.8***
Current reverse (V_R = 5V)	µA	2	10	10	10	2	2	2	10	10	10
Wave length	nm	460	563	585	650	565/590	625/565	625/590	570	587	635
Spread	Δnm	40	40	40	40	35	35	35	25	45	45
Spread angle	degree	20	45	45	45	60	60	60	80	90	55
Luminous Intensity	Min. mcd	20	9.0	5.6	5.6	8	8	8	71****	71****	100****
	Typ. mcd	25	25	16	16	25	25	25	112****	112****	160****
Orientation	The longer pin is the anode, the shorter is the cathode. For bicolor LEDs the anode for the first colour (ex. 2080) is the longer pin.										

***/$_F$ = 50mA, ****Luminous Flux mlm

For 4A/4F switches		illumec™ LEDs specifications				
Colour		**B**	**G**	**Y**	**W**	**R**
Colur Codes		01	22	42	61	82
Absolute Maximum Ratings	(Ta=25°C)					
Power	mW	60	65	65	80	65
Current forward	mA	20	25	25	15	25
Forward peak current	mA	150	150	100	200	100
Voltage reverse	V	5	12	12	5	12
Operating temperature	°C	-30 - +85				
Storage temperature	°C	-30 - +85				
Soldering temperature	°C	245 for max. 10 sec.				
Electrical-Optical Characteristics	(Ta=25°C)					
Voltage forward	Typ. V	3.35	2.2	2	3.05	2
	Max. V	3.5	2.5	2.5	3.2	2.5
Current reverse (V_R = 5V)	µA	0.01	0.02	0.01	0.01	0.01
Wave length	nm	470	570	588	n.a.	633
Spread	Δnm	n.a.	30	16	n.a.	16
Spread angle	degree	145	160	160	138	160
Luminous Intensity	Min. mcd	30	28	112	28	112
	Typ. mcd	35	70	150	35	150
Optical Intensity	Lm/w	4			2.5	

B= Blue, G= Green, Y= Yellow, R= Red, W= White, G/Y= Green/Yellow, R/G= Red/Green, R/Y= Red/Yellow
Specifications are subject to change without notice.

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multimec® Solid Colours

No. Colour RAL Code	00 blue 5012	02 green 6018	03 grey 7004	04 yellow 1023	06 white 9010	08 red 3000	09 black 9004

No. Colour RAL Code	30 ultra blue 5002	32 mint green 6029	33 tele grey 7046	34 melon 1028	38 noble red 3002	40 dusty blue 5014	42 aqua blue 5021

Metallic Colors

No. Colour RAL Code	50 dark blue No RAL Code	53 light grey No RAL Code	57 dark grey No RAL Code	58 bordeaux No RAL Code

Cap		00	02	03	04	06	08	09	30	32	33	34	38	40	42	50	53	57	58
1A		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1B		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1C		X	X	X	X	X	X	X											
1D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1E		X	X	X	X	X	X	X											
1F		X	X	X	X	X	X	X											
1H		X	X	X	X	X	X	X											
1K		X	X	X	X	X	X	X											
1M		X	X	X	X	X	X	X											
1N		X		X	X		X	X											
1P		X	X	X	X	X	X	X											
1Q		X		X			X	X											
1R		X		X			X	X											
1S								X											
1T		X		X			X	X											
1U		X		X			X	X											
1V		X		X			X	X											
1WA/1WD/1WP		X		X			X	X	X					X	X		X	X	
1X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1ZA				X		X		X	X					X	X	X	X	X	X
1ZB				X		X		X	X					X	X	X	X	X	X
1ZC				X		X		X	X					X	X	X	X	X	X

The RAL Codes mentioned are the codes nearest to the solid colours in the multimec® range.

For updates of products and/or changes of specifications please see **www.mec.dk**

mec Usage Guidelines

How to get the best results with mec switches

These guidelines are offered to users of mec switches as an aid to ensure successful and reliable switch operation.

Temperature

Both Unimec™ and Multimec® switches are produced in standard and high temperature versions. Please see the technical specifications for details on operating and storage temperatures and soldering guidelines to make sure you select the best switch for your application. When wave soldering is taking place, mec strongly recommend that the temperature profile is analyzed and compared with the temperature rating of the switch. In case of doubt always select the high temperature versions Unimec™ 154XX and Multimec® 3XXHX. It is also important to monitor the accumulated heat build up from both the pre-heat zones and the solder zone.

Most standard accessories for both Unimec™ and Multimec® switches are made from ABS plastic with a maximum operating temperature of 65°C. It is strongly recommended that accessories are mounted after soldering of the switch. If this is not possible care must be taken not to overheat the accessories during the soldering process. Actuators for the 3EXX9, the 1S09 and Varimec™ caps are, however, made of high temperature materials and will meet the same temperature specifications as the high temperature switches.
For accessories made from other plastic materials please see Multimec and Unimec technical specifications.

LEDs have their own temperature specifications. When fitted in a high temperature switch the LED will determine the max. operating temperature, i.e. 3FTH923 has an upper temperature limit of 85°C – not 160°C! This also applies to the 4A and 4F switches.

Mounting and Dismounting

If switches are to be mounted in rows it is essential that the recommendations regarding spacing are followed. PC board thickness should be 1.2 to 1.6 mm and terminal hole diameter should be 0.9 mm.

All Unimec™ and Multimec® caps and bezels are easily snapped onto the switch modules and can be changed at a later time with the exception of the Unimec™ 16.700 cap. The same applies to the 3E caps/actuators. Once these caps are installed they are not designed to be removed. To do so may cause damage to the switch and the PC board if not done very carefully. If the 16.300 or 16.700 cap must be removed from a Unimec™ alternate action switch, make sure that the switch actuator is in the released, upper position before attempting to remove the cap. This will prevent possible damage to the internal latching pin.

Care must be taken when inserting the 3FT switch and LED assembly into the PC board. Do not press direct on the LED. This will force the LED down into the actuator and risks to cause the switch contacts to remain in the closed position. To correct the fault, the LED must be raised slightly and centered in the actuator to assure unrestricted movement of the actuator. A mounting tool is available for Multimec® switches.

Soldering and Cleaning Unimec™

Most assembly and field problems experienced by users of unsealed switches are caused by the contamination of the contacts during soldering and cleaning.

Contact contamination may be recognized by an increase in contact resistance and possible intermittent operation of the switch, especially in low power applications. Care must be taken not to submerge the switch in cleaning agents or spray the switch during cleaning. The switch must be protected at all times to prevent contamination by flux or cleaning liquids.
For Unimec™ alternate versions we recommend to leave the actuator in the released upper position during soldering. This makes the switch more resistent to overheating.

Soldering and Cleaning Multimec®

Multimec® switches are fully sealed to IP67 specifications to prevent solder flux and aqueous or solvent based cleaning solutions from entering the switch and contaminating the contacts. The switches can be placed on the PC board with other components and wave soldered. Multimec® offers a high level of sealing, however, with aqueous solvent solutions care must be taken to avoid the worst case situation with water jets, complete immersion into a liquid with a temperature below the board or surface tension reducing additives.
Recommended cleaning methods are demineralized water. Any surface tensions reducing agents, such as soap, must not be used as they risk causing a potential leakage of the switch.

Soldering - Through Hole Versions

Hand soldering: Max 350°C for max. 3 sec., this applies for both low temperature and high temperature versions.
Wave soldering: Heat built up in the switch during pre-heating and soldering must not exceed the maximum operating temperature of the switch. If, for some reason, a high pre-heating temperature is required, mec recommend the high temperature switches. In any case peak temperature must not exceed 260°C, and soldering time is max. 10 sec.

Soldering - Surface Mount Versions

For all methods – infrared, convection and vapour phase. The upper limit 260°C/30 sec. must be observed. The soldering temperature profile must have moderate temperature gradients.

RoHS Compliance

As of 1 July 2006 mec has completed the conversion to RoHS compliance. A separate part number system assures that there will not be any risk for mixing products in the supply chain. For more info please see our homepage www.mec.dk

General Temperature Limits:

Low Temperature	115°C
High Temperature	160°C
LEDs	85/100°C
Accessories	65/85/160°C

Packaging

Unimec™ and Multimec® switches are packed in rigid tubes of 50 pieces each.
A box contains 1.000 pcs.
The surface mount versions of Multimec® switches with a height up to 12.5 mm can also be delivered on tape/reel. Each reel contains 250/500 pcs.

For updates of products and/or changes of specifications please see **www.mec.dk**

Custom Products from Conception to Completion

mec are mastering all technologies for the design and manufacture of switches and accessories. The wide range of mec standard products is well known world wide, but also many custom solutions have been created. mec offer to be your partner from conception to completion. Our R/D engineers generate computer animated solutions, rapid prototypes and manage the whole industrialisation process.

We welcome any custom requirement.

- **Navigation module**
- **Cap with concave surface**
- **Fluorescent legends**
- **Different actuation forces**
- **Reverse printed legend on translucent cap**
- **Quiet switches with and without tactile feeling**
- **Cap colours matched to customer's request**
- **Right angle switches with integrated illumination**
- **Customer specified ultra bright LED**
- **Ultra high temperature Cap**

Please consult factory with your custom requirement.

For updates of products and/or changes of specifications please see **www.mec.dk**

switches

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