PRODUCT CATALOGUE
2020 - 2021

MOTORLIGHT®

INDEX

ABOUT US

Tudor Industries Ltd. was founded in Brazil in 1993 by a group of highly experienced Brazilian entrepreneurs with expertise of more than 40 years in the battery business. Production facilities are strategically located to supply Brazilian and International markets with agility and efficiency. One facility is located Bauru, in the State of San Paolo – Tudor SP – which supplies South, Southeast part of North Region and the international markets.The Motorlight brand has been created in order to especially supply international market and with the success achieved we make available specific distribution of this brand in the internal market.

CERTIFIED QUALITY

We search for excellence to manufacture our products which rely on high technology, quality standards and Motorlight performance in line with the demands of the Brazilian market. For this reason batteries produced in Brazil are certified by INMETRO. All lines of automotive batteries are homologated in accordance with Regulations 301/2011 and 299/2012 by INMETRO. Motorlight batteries are produced in conformity with ISO 14001, certification which recognizes best practices in environmental management and in conformity with IATF 16949 international system ensuring Motorlight batteries quality standards required by the greatest global car manufacturers.

MOTORLIGHT®

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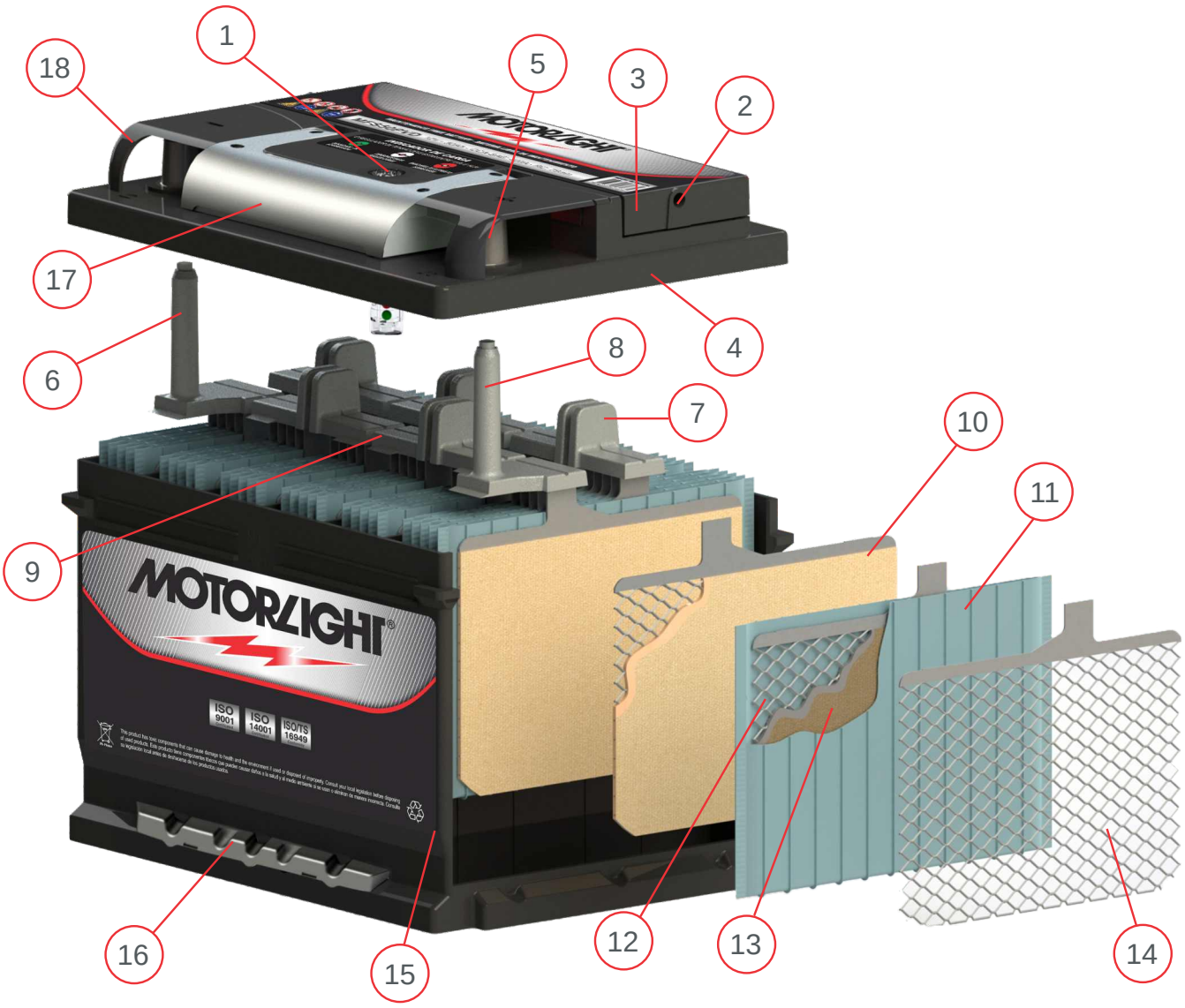
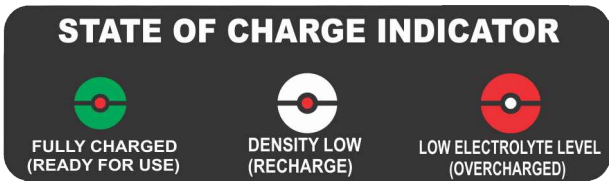
UNIT BAURU-SP/BRAZIL

UNIT GOVERNADOR VALADARES-MG/BRAZIL

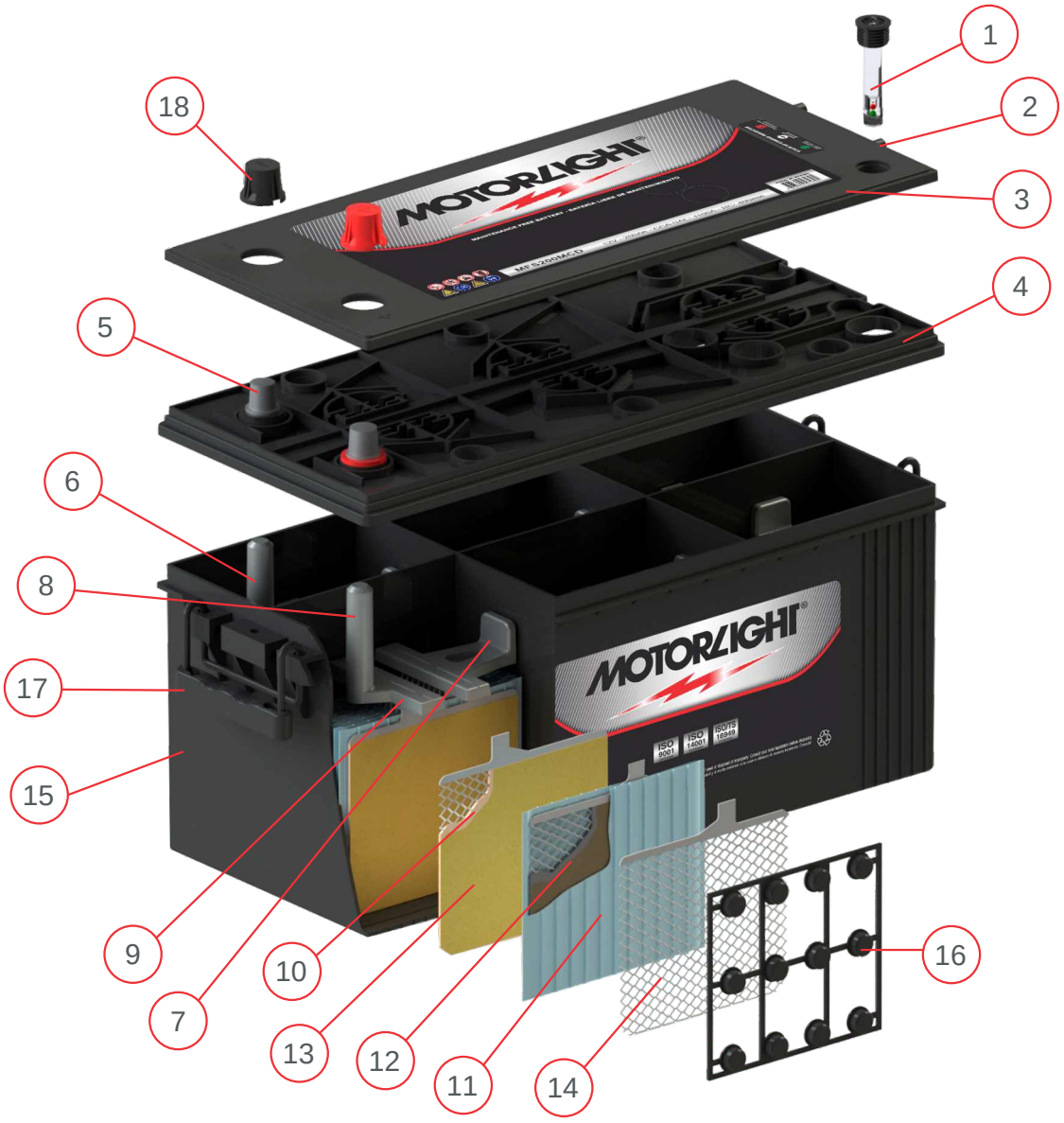


1 - Charge indicator.
2 - Breather with built-in flame arrester.
3 - Sealed overcap (with condensation chamber).
4 - Sealed lid.
5 - Type 1 standard pole.
6 - Post connector (Negative).
7 - Connector of the elements.
8 - Post connector (Positive).
9 - Highly resistant plate welding.
10 - Positive plate with active material (without formation).
11 - Polyethylene separator (envelope type).
12 - Negative plate with active material (without formation).
13 - Paste paper.
14 - Laminated / expanded grid.
15 - Polypropylene monoblock.
16 - Multiple base adapter.
17 - Built-in handle.
18 - Pole protector.



BUILT-IN FLAME FILTER RESPIRATION

Breather hole allows the installation of the gas kit, mandatory for batteries installed inside the vehicle, including the trunk.



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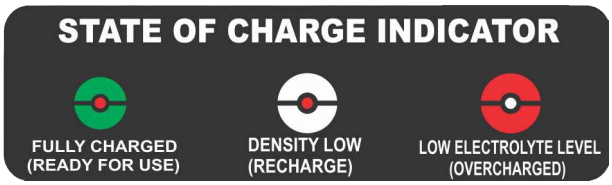

BUILT-IN FLAME FILTER RESPIRATION

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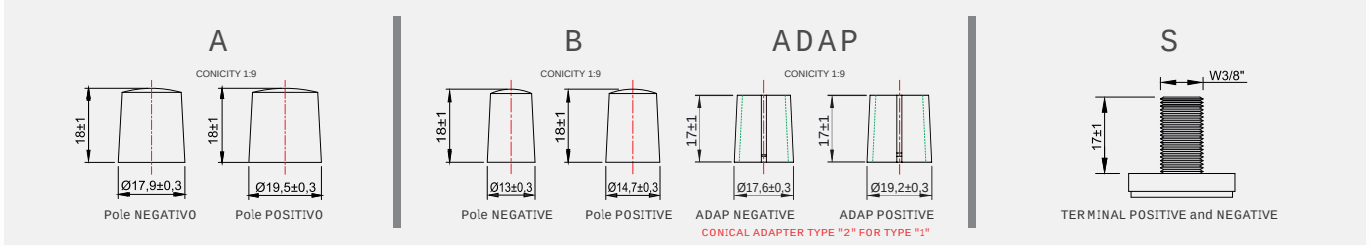
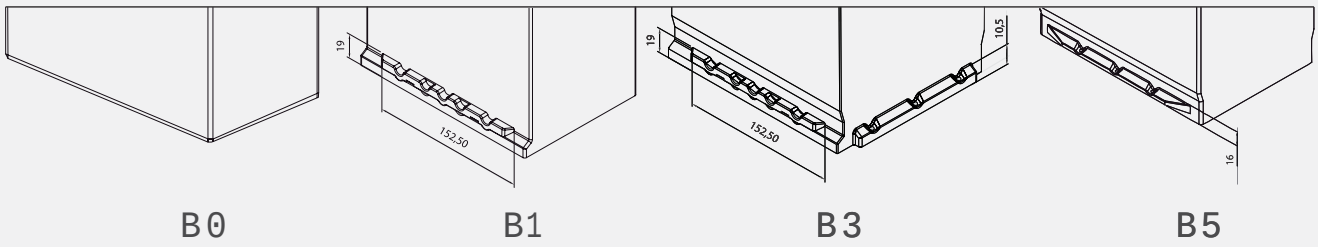
Terminal Type



Measurements without units consider millimeters (mm)

Base Type



Measurements without units consider millimeters (mm)

SLI SMF

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFR36PVD	LB1	99R	-	209	174	175	7	36	280	370	45	10,08	-/+	A	B3
MFR40PVD							7	40	300	400	60	10,90	-/+	A	B3
MFR45PVD							8	45	350	450	62	11,23	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFR36PVI	LB1	99	-	209	174	175	7	36	280	370	45	10,08	+/-	A	B3
MFR40PVI							7	40	300	400	60	10,90	+/-	A	B3
MFR45PVI							8	45	350	450	62	11,23	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS44PHD	L1	140R	-	209	174	190	8	44	350	450	60	11,80	-/+	A	B3
MFS50PHD							9	50	400	460	75	12,54	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFR45MPVD	LB2	42R	-	242	174	175	8	45	350	425	62	11,90	-/+	A	B3
MFS50PVD							9	50	400	450	75	12,82	-/+	A	B3
MFS55PVD							10	55	450	575	85	13,29	-/+	A	B3
MFS60PVD							11	60	480	600	90	14,00	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFR45MPVI	LB2	42	-	242	175	175	8	45	350	425	62	11,90	+/-	A	B3
MFS50PVI							9	50	400	450	75	12,82	+/-	A	B3
MFS55PVI							10	55	450	575	85	13,29	+/-	A	B3
MFS60PVI							11	60	480	600	90	14,00	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS55PHD	L2	47R	-	242	175	190	10	60	470	575	90	13,61	-/+	A	B3
MFS60PHD							11	60	480	600	100	14,42	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS55PHI	L2	47	-	242	175	190	10	60	470	575	90	13,61	+/-	A	B3
MFS60PHI							11	60	480	600	100	14,42	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS65PSD	LB3	91R	-	277	174	175	12	65	520	620	110	15,86	-/+	A	B3
MFS70PSD							13	70	550	650	115	16,54	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS65PSI	LB3	91	-	277	174	175	12	65	520	620	110	15,86	+/-	A	B3
MFS70PSI							13	70	550	650	115	16,54	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS66PHD	L3	48R	-	277	174	190	12	66	530	630	105	16,67	-/+	A	B3
MFS75PHD							13	75	570	670	120	17,33	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS66PHI	L3	48	-	277	174	190	12	66	530	630	105	16,67	+/-	A	B3
MFS75PHI							13	75	570	670	120	17,33	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS75PDD	T65	41R	-	286	174	174	13	75	570	670	120	17,20	-/+	A	B1

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS75PDI	T65	41	-	286	174	174	13	75	570	670	120	17,20	+/-	A	B1

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS80PHD	L4	94R	-	313	174	190	15	80	620	720	140	18,69	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS80PHI	L4	94	-	313	174	190	15	80	620	720	140	18,69	+/-	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS95PHD	L5	49R	-	354	174	190	17	95	750	850	170	21,80	-/+	A	B3

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFR36NSD ADAP B1	-	151R	B19	196	137	226	7	36	260	325	45	10,10	-/+	B	B1
MFS42NSD ADAP B1							9	42	320	375	65	10,89	-/+	B	B1
MFS42NSD							9	42	320	375	65	10,89	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFR36NSI ADAP B1	-	151	B19	196	137	226	7	36	260	325	45	10,10	+/-	B	B1
MFS42NSI ADAP B1							9	42	320	375	65	10,89	+/-	B	B1
MFS42NSI							9	42	320	375	65	10,89	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS45NSD ADAP	-	51R	B24	239	129	226	9	45	350	425	65	12,15	-/+	B	B0
MFS45NSD							9	45	350	425	65	12,15	-/+	A	B0
MFS52NSD ADAP							11	52	400	500	80	13,04	-/+	B	B0
MFS52NSD							11	52	400	500	80	13,04	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS45NSI ADAP	-	51	B24	239	129	226	9	45	350	425	65	12,15	+/-	B	B0
MFS45NSI							9	45	350	425	65	12,15	+/-	A	B0
MFS52NSI ADAP							11	52	400	500	80	13,04	+/-	B	B0
MFS52NSI							11	52	400	500	80	13,04	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS60PDD	-	35R	D23	229	173	225	11	60	480	580	100	14,81	-/+	A	B5
MFS70MDD							10	70	500	625	115	16,85	-/+	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS60PDI	-	35	D23	229	173	225	11	60	480	580	100	14,81	+/-	A	B5
MFS70MDI							10	70	500	600	115	16,85	+/-	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS70-580D	-	34	-	260	173	202	13	70	580	680	130	18,75	-/+	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm) L	W	TH	Plates Cell	Ah 20Hr	CCA SAE	CCA MIDTRONICS	RC min	Weight kg	Polarity	Terminal	Base
MFS70-580I	-	34L	-	260	173	202	13	70	580	680	130	18,75	+/-	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS70DMD	-	24R	D26	260	173	225	11	70	500	625	115	17,21	-/+	A	B5
MFS75MMD							11	75	550	650	120	18,63	-/+	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS70DMI	-	24L	D26	260	173	225	11	70	500	625	115	17,21	+/-	A	B5
MFS75MMI							11	75	550	650	120	18,63	+/-	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS70DCD	-	27	D31	304	173	225	11	70	500	625	120	18,20	-/+	A	B5
MFS75MCD							11	75	550	650	120	19,62	-/+	A	B5
MFS90MCD							13	90	650	750	170	21,44	-/+	A	B5

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS70DCI	-	27L	D31	304	173	225	11	70	500	600	120	18,20	+/-	A	B5
MFS75MCI							11	75	550	650	120	19,62	+/-	A	B5
MFS90MCI							13	90	650	750	170	21,44	+/-	A	B5

SLI SMF HEAVY DUTY

SLI SMF HEAVY DUTY

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS90MRD	-	31A	-	330	174	245	13	90	650	750	170	23,50	-/+	A	B0
MFS100MRD							15	100	750	850	180	25,30	-/+	A	B0
MFS105MRD							17	105	800	900	190	27,60	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS90MTD	-	31T	-	330	174	245	13	90	650	750	170	23,40	-/+	S	B0
MFS100MTD							15	100	750	850	180	25,20	-/+	S	B0
MFS105MTD							17	105	800	900	190	27,50	-/+	S	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS100MPI	-	31A	-	330	174	245	15	100	750	850	180	24,80	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS120MHD	DIN A	-	-	512	189	218	17	120	800	900	200	33,40	-/+	A	B0
MFS140MHD							21	140	920	1000	290	35,80	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS120MHI	DIN A	-	-	512	189	218	17	120	800	900	200	33,40	+/-	A	B0
MFS140MHI							21	140	920	1000	290	35,80	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS135MVD	-	4D	-	508	215	232	19	135	850	950	260	40,36	-/+	A	B0
MFS150MVD							21	150	900	1000	280	41,86	-/+	A	B0
MFS180MVD							25	180	1000	1200	350	45,85	-/+	A	B0

SLI SMF HEAVY DUTY

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS135MVI	-	4D	-	508	215	232	19	135	850	950	260	40,36	+/-	A	B0
MFS150MVI							21	150	900	1000	280	41,86	+/-	A	B0
MFS180MVI							25	180	1000	1200	350	45,85	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS200MCD	-	8D	-	516	275	242	29	200	1100	1300	400	55,70	-/+	A	B0
MFS220MCD							33	220	1200	1400	450	58,50	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MFS200MCI	-	8D	-	516	275	242	29	200	1100	1300	400	55,70	+/-	A	B0
MFS220MCI							33	220	1200	1400	450	58,50	+/-	A	B0

SLI HEAVY DUTY with access

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MXS100MPI	-	31A	-	330	174	245	15	100	750	850	180	24,80	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MXS135MVD	-	4D	-	508	215	230	19	135	850	950	260	39,40	-/+	A	B0
MXS150MVD							21	150	900	1000	280	42,00	-/+	A	B0
MXS180MVD							25	180	1000	1200	350	45,20	-/+	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MXS180MSI	DIN B	-	-	512	222	220	25	180	1000	1200	350	43,70	+/-	A	B0

MESTRE	DIN	BCI	JIS	Dimensions(mm)			Plates	Ah	CCA	CCA	RC	Weight	Polarity	Terminal	Base
				L	W	TH	Cell	20Hr	SAE	MIDTRONICS	min	kg			
MXS200MCD	-	8D	-	511	271	235	29	200	1100	1300	400	55,40	-/+	A	B0
MXS220MCD							33	220	1200	1400	450	58,20	-/+	A	B0

GENERAL RECOMMENDATIONS

LOW MAINTENANCE BATTERIES

Low-maintenance batteries are shipped with the internally aggregated electrolyte and are ready for use provided they meet the specified density, electrolyte level, and voltage conditions as described below.

ROTATIVITY

Batteries should be stored in such a way that stock turnover allows the first-produced batteries (PEPS) to be sold. If the batteries are not placed on shelves, stack the light batteries by no more than 5 units. And for heavy batteries, stack up to 3 units.

BATTERY CHARGE REPLACEMENT IN STOCK

All batteries, when stored, gradually lose their charge, and in summer this process is more intense. Therefore, periodic inventory review is required to recharge all new batteries with their voltage below 12.40 volts or density between 1,230 g/l and 1,240 g/l at 27 °C before installing, checking that the electrolyte level is correct if they have access.

STOCK PLACE

Battery storage should be dry and ventilated, away from sunlight or heating sources, as the higher the ambient temperature, the higher the self-discharge in stock.

MAINTENANCE FREE BATTERIES

These are automotive batteries of modern design that do not oblige the user to perform periodic maintenance regarding the addition of water. These batteries are sealed and provided with small gas exhaust holes, not allowing the user to take electrolyte density readings.
Its state of charge is verified by reading the voltage between the terminal poles as shown below:

To know the density, measure the voltage (voltage) between the poles and calculate the density by the equation below:

D = Density in g/l (grams per liter)
V = Voltage (voltage)
X = Number of Cells (Elements)
0.84 = Constante

$$D = \frac{V}{X} - 0.84$$

Ex .: Voltage equal to 12.40 volts, divided by "X" number of cells (elements) of the battery and subtracted the constant 0.84.

$$D = \frac{12.40}{6} - 0.84 \qquad D = 2.067 - 0.84$$

$$D = 1{,}227\ g/cm^3 = 1{,}227\ g/l$$

HOW TO TEST

The most common test for checking the state of charge of a battery is to measure its density.
This test is performed by introducing a device called a densimeter in one of the vessels.

	LOAD STATUS, DENSITY AND VOLTAGE INDICATOR TABLE		
	DENSITY (g/l)	CHARGE	VOLTAGE (12 V)
	1,270 - 1,280	100%	12.75
	1,240 - 1,250	75%	12.50
Recharge the battery	1,220 - 1,230	50%	12.41
	1,160 - 1,210	25%	12.19
	1,160	Unloaded	12.04
The above values refer to an electrolyte at 27 °C			

Another device for checking battery charge status may be an electronic analyzer.

SLI / EFB - BATTERY RECHARGE

A) The recommended system for recharging batteries is slow charging. Rapid charging due to damage to the battery should only be used in case of a real emergency.

B) For the correct application of the slow or normal load, it is recommended to have at hand a densimeter, two-point voltmeter after the comma, 0-20 V and a 0-100 °C thermometer graduated one by one, all calibrated. . For batteries without access to electrolyte, the densimeter is not required.

C) Recommended charging current (Amps) may be 5% to 10% maximum of the nominal Ah capacity of the battery. Ex: Battery with capacity of 140 Ah, can be charged from 7 A to 14 A maximum.

NOTE: Limit the maximum current to never exceed 50 °C.

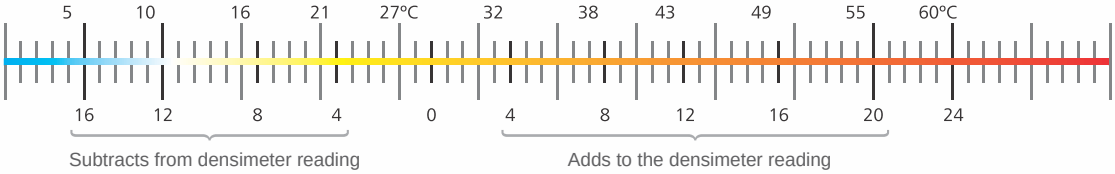
D) Always follow the manufacturer's recommendation of the charger used for the maximum number of batteries the device can charge at one time. Give preference to electronic battery chargers.

E) Prior to switching on or during charging the battery, top up the battery electrolyte level only if necessary with water suitable for use in batteries; however, never add solution. The level should be a minimum of 10 mm and a maximum of 20 mm above the tabs for batteries with electrolyte access. For batteries without access to the electrolyte, observe the charge indicator. If it is red, replace the battery.

F) The battery should be removed from the device only when it is fully charged. A safe way to know when it is at full load will be by checking:
- Density to be 1,275 g/l ± 5 g/l at 27 °C;
- Voltage between poles with the battery still connected to the device must be at least 15.80 V during two consecutive readings, one hour apart, under the same electric current.

G) During charging, the electrolyte temperature increases relative to the ambient temperature. The higher the current (Amps) applied, the higher this temperature should be, which should not exceed 50 °C, otherwise it may damage the internal components of the battery. This check should be done by inserting a graduated glass thermometer into one of the battery's central vessels or, when access is not possible, to one of the outer side surfaces of the housing as close as possible to the central region.

H) Temperature measurement is required to correct the density reading, and it is agreed that a fully charged battery should have a density of 1,275 g/l ± 5 g/l at 27 °C. Any temperature above or below 27 °C alters the reading of the densimeter, making correction necessary as follows:



Ex.: Reading with densimeter 1,230 g/l, temperature 55 °C. We add 20 points and get real reading of 1,250 g/l.

INSTALLING THE BATTERY IN THE VEHICLE

a) Each vehicle operates with a specific battery, so install the correct battery for each vehicle (see Application Table);

b) Only install batteries at full load capacity 1,275 g/l ± 5 g/l and minimum voltage of 12.60 V (measure the battery after 3 hours of the end of charge);

c) Make sure that the cables and terminals are in good condition and clean, and that the alternator belt is tight. The battery must be fixed according to the dimensions of the support to avoid damage to the battery and accidents such as: short circuit, fire, leakageand etc.

d) Check the polarity of the cables before making the connection if the connection is reversed will seriously damage the vehicle's electrical components. Finally connect the negative polarity cable (-);

e) The vehicle's voltage regulator should be between 13.80 V (minimum) with all consumers connected, and 14.50 V (maximum) with all consumers turned off, the ideal being 13.90 V. On vehicles with old electrical systems (generator) and all consumers connected, the minimum allowable voltage of the voltage regulator must be equal to 13.20 V, provided that, in the electrical balance test, the current is positive.

f) Recommend to the owner a periodic check, especially regarding the electrolyte level, when the battery is accessible. This, whenever necessary,
it must be completed, without overflowing, with distilled water, at most 20 mm above the separator.

g) When the battery is from the Free line (without access) check the electrolyte level through the densimeter (peephole) every 3 months or check the label, corresponding indication.

SOME OF THE MAIN REASONS FOR BATTERY FAILURES IN USE

a) Battery discharge (insufficient charge) - Reasons:

- Battery installed without being fully charged;
- Deficiency in the vehicle's charging system (checking the voltage regulator/ alternator);
- Intensive use of the match;
- Headlights on or radio on for long periods with the vehicle stopped;
- Short circuit in the electrical system;
- Vehicle with dynamos (ex: Beetle);
- Vehicles stopped for long periods.
- Electrical imbalance.

b) Battery overload (overload):

The only reason for this problem is that the regulator is voltage higher than specified, under normal conditions and high speed, releasing an excessive current that increases the internal temperature of the battery, causing it to evaporate intensely the water contained in the electrolyte, consequently damaging and irreversibly the internal components of the battery, at least effect of temperature and electrolyte acid concentration, in some cases, liquid leaking through the breather.

The overhead can be generated by:

- Excessive cycling;

- Deep cycling;

- Voltage above specified;

- Excess water in batteries with access.

IMPORTANT NOTES:

Warranty terms items

- In some vehicles such as Besta, Topic and Sprinter, for use in vehicles, among others, the battery is damaged by the excess heat generated at the installation site, considerably reducing its useful life. The periodic review in these cases should be more careful and more frequently. The warranty on these applications will be 6 months from the date of sale. When used in natural gas or industrial vehicles, including forklifts, check the solution level, at most, every 60 days.
- It is not recommended to use Maintenance Free Motorlight on vehicles that generate a lot of heat at the installation site or as a main source of energy. The purpose of the battery is to start the vehicle; sporadically, it can be used as a source of energy for other purposes, but its continued use damages the battery early. Military vehicles, such as Blazer, that use the gyro flex system visual identification, communication radio and headlights on, usually damage the battery with little use. In such cases, the Maintenance Free Motorlight battery, if installed, will be guaranteed for 6 months from the date of sale.
- For uses such as high-powered sound systems, TVs and stationary units (UPS), the warranty will be 3 months from the date of sale. This observation is valid for all the automotive line. For these applications we recommend the Sound and Stationary line.
- When the original equipment / accessories are changed or added by changing the power consumed, the electrical system, including the battery, must be resized.
- Vehicles that use 2 batteries (24 V system) always use a 24 V/12 V converter to supply 12 V equipment / accessories to avoid battery imbalance causing overload in one battery and underload in another.

NOTE: Always replace both batteries at the same time.

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