Spot Light On; Energy

Boost Revenue Up with Motorola Original Accessories

The purpose of this edition of Spotlight is to focus on Energy products associated with Motorola licensed two way radios; battery and charging solutions for Motorola Digital and Analogue range.

By raising your awareness and understanding of Motorola's Energy Portfolio, we believe you can increase your sales. As well as creating greater revenue potential, selling Accessories with radios as a solution offers more reason to contact and support your customer.

Focus on the quality and brand. We will never be the cheapest but will always be competitive.

The advantages of selling Motorola Original Accessories are considerable – both for you and your customers:

- Motorola offers the broadest accessory portfolio on the market today, created to meet user demands. Our energy, audio and carry solutions have been specifically designed and tested to optimise the performance of our portable and mobile two-way radios and to enhance workforce efficiency and safety.

- Motorola Original Accessories increase talk time, comfort and audio quality, allowing users to customise their communications according to their particular needs. From our low-cost Mag One range to our mid and high tier more sophisticated technologies for GP, CP and TRBO, we are able to meet a wide variety of professional requirements and work environments. This means we can save organisations money by maximising productivity while assuring superior quality that's as reliable as our two-way radios.

- Our accessories have been tested to withstand vibration, shock and extreme temperatures. We have also developed a range of solutions for damp, dusty and hazardous environments.

- Tests on competitor batteries have proved that many offer inconsistent performance, poor quality components and are unable to withstand harsh use. The result is decreased life-cycle and lower capacity, so users have less talk time and batteries have to be replaced more frequently.

- Motorola is the only company to offer IMPRES – an intelligent energy management solution that uses innovative technology to maximise battery life and automate maintenance.

And remember, use of non-Motorola accessories invalidates the warranties on our two-way radios and may result in RF energy exposure standards being exceeded.

The topics covered include:

- The different battery types
- Battery Chemistries; comparison
- Getting the most out of Motorola batteries
- Motorola battery quality
- Charging solutions
  - Chargers
  - Conditioners
- Impres; smart battery management
- Quick reference guides for current and legacy batteries
- Glossary of Terms
- Useful Links

Battery Types

Chemistries of the Battery Cells

There are three main chemistries of cells;

- o Nickel Cadmium (NiCd)
- o Nickel Metal Hydride (NiMH)
- o Lithium Ion (LiION)

Of the above Nickel Cadmium as a battery chemistry is being phased out in some countries due to its impact on the environment. The performance of the different cell chemistry needs to be considered when recommending them to your customer. Parameters such as, how long should the battery last between charges and whether the battery is to be used in very cold areas are important in the selection criteria.

The advantages and disadvantages for each cell chemistry are listed in the table below.

NiCD Impres

NiMH Impres

Li-Ion Impres

Parameter	Description	Nickel Cadmium (NiCAD)	Nickel Metal Hydride (NiMH)	Lithium Ion (LiION)
Battery Capacity	This parameter is stated in milli amp hours (mAH). The higher the number the longer the Operation Time. This is the time before the battery needs to be re-charged. It is based on a typlical 5-5-90 Duty cycle. This means the radio is transmitting for 5% of the time, receiving for 5% of the time and in standby for 90% of the time. Should the operation requirements be outside this duty cycle, then the operation time will change accordingly. TDMA radios such as Mototrbo and TETRA have longer battery life than FDMA	Up to 2000mAH	Up to 2000mAH	Up to 2200mAH
Number of Cycles	This is the number of time typically the battery can be charged and discharged cycles before the battery should be considered for replacement. As the battery is used the capacity of its cells will be reduce. After the stated number of cycles the capacity of the battery when fully charged can be below 80% of its rated capacity.	550	500	450
Operating Temperature Range	This is the minimum and maximum temperature which the batteries can be relied on to perform their function. As the temperature reduced the Operating Time also reduces. The performance at -30 degrees C is stated below.	-30 to +60 Degress C	-20 to +60 Degress C	-10 to +60 Degress C
Memory Effect	Where particularly NiCd batteries gradually lose their maximum energy capacity if they are repeatedly recharged after being only partially discharged. The battery appears to "remember" the smaller capacity.	High	Medium	None
Self Discharge	Self-discharge is a phenomenon in batteries in which internal chemical reactions reduce the stored charge of the battery without any connection between the electrodes. Self-discharge decreases the time batteries can be left before they are put into operation. 15-20% per month; nickel metal hydride, 30% per month). This may be accelerated with protection circuitry within the battery.	Medium -15-20% Discarge per month	High -30% Discharge per month	Low -2-3% Discharge Per Month
Shelf Life	This is the period of time the maximum period of time it is recommended to store a battery	2 Years	18 months	18 month
Battery Initializing	This is the time period that it is recommend to charge a battery before putting it into service	Overnight	Overnight	1 Hour after charger indicator is steady green

Care of Batteries

Getting the Most out of Motorola Batteries

1. Charge your new battery overnight before using it. This is referred to as INITIALIZING and will enable you to obtain maximum battery capacity.

a. Nickel Cadmium or Nickel Metal Hydride: 14-16 hours.

b. Lithium Ion: 1 to 2 additional hours after the charger LED turns green.

2. Motorola Impres™ batteries, when inserted into a Motorola impres charger, will indicate a calibration cycle by displaying a steady Yellow indication on the charge status indicator. Allow this calibration process to complete by not removing the battery from the charger until it has completely charged and displays a steady green indication.

3. In order to minimize capacity loss and cycle life reduction, new, NON INITIALIZED batteries must be stored in well ventilated, cool and dry locations. Batteries stored in these conditions may be stored:

a. Nickel Cadmium up to 2 years.

b. Nickel Metal Hydride up to 18 months.

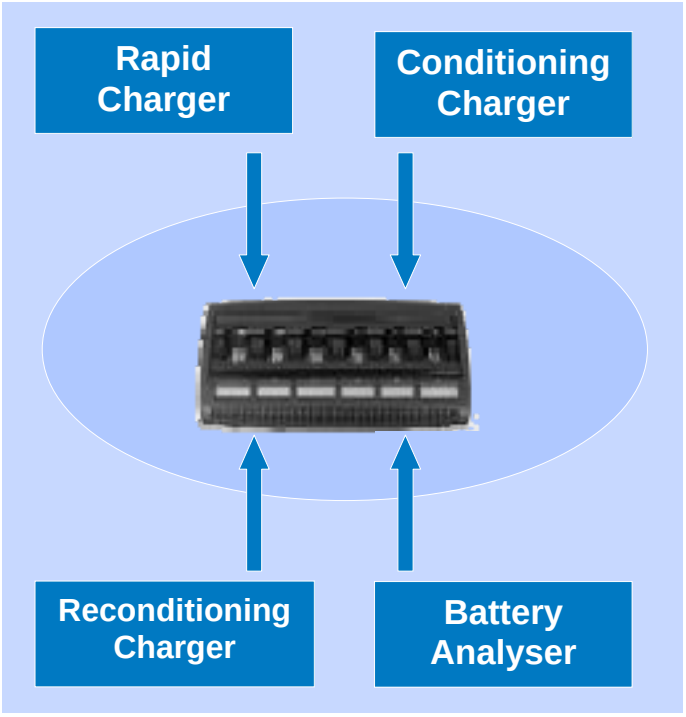
c. Lithium Ion up to 18 months.

4. If used batteries are to be removed from service for extended periods (greater than 30 days) they should be discharged to about 50% of their capacity before storage in a cool, dry location.

5. Batteries which have been in storage for more than two months should be fully discharged and recharged.

a. Nickel Cadmium or Nickel Metal Hydride: 14-16 hours.

b. Lithium Ion/Polymer: 1 to 2 additional hours after the charger light turns green.



4in1 SOLUTION: MOTOROLA IMPRES CHARGER

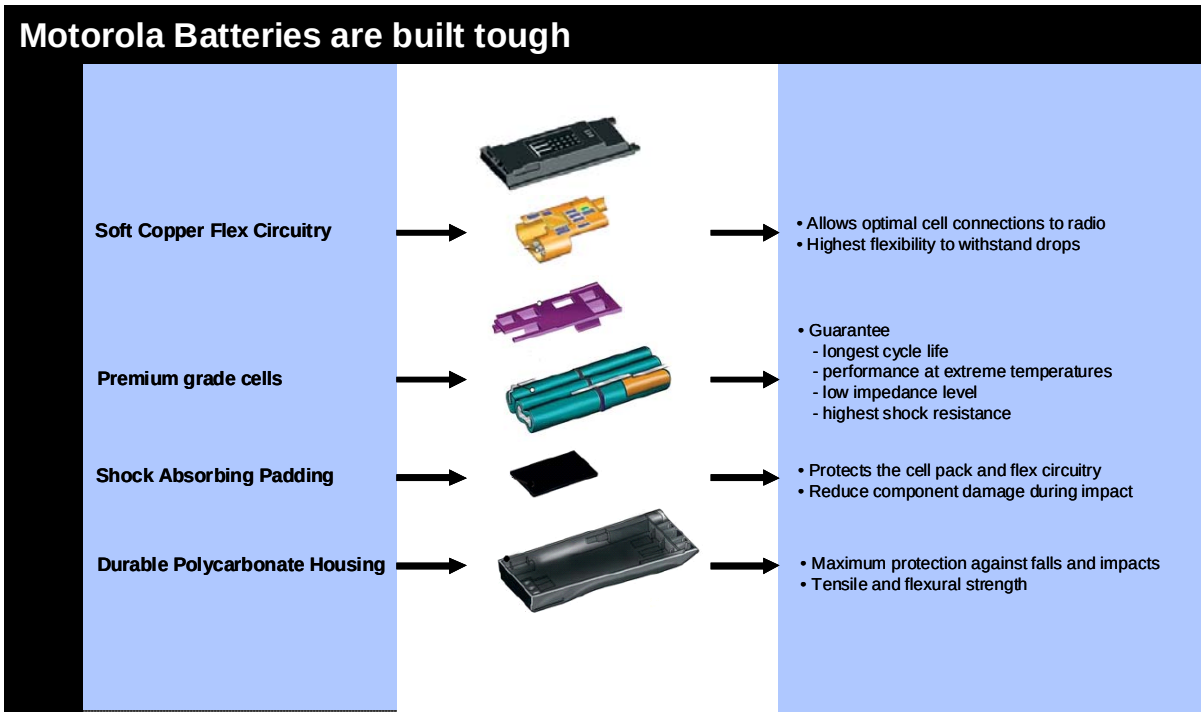
Motorola Battery Quality

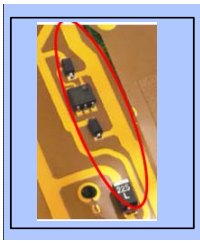
The difference is on the inside

The problem is that a non original battery looks pretty much like a genuine Motorola battery. However there are significant differences on the inside.

Motorola selects premium battery cells for inclusion in its battery products. This ensures that the battery delivers consistent performance over their operational life.

Built to last longer



	Motorola Battery	
Safe		**SAFETY CIRCUITS** • Over & Under Voltage Protection • Over Discharge Protection • RF Protection PLUS • Drop tested (1.20 m height)
Robustness		**FLEX CIRCUITS** • Highest drop/shock resistance
Long Life		**PROPER SPOT WELD** • Maximized power • Long lasting performance
Reliable		**AUTOMATED SOLDERING** • Consistent quality • Highest level of reliability

Charging Solutions

The Range

Motorola has a range of charging solutions for its two way radio products.

- Single Unit Chargers (SUC)
- Multi Unit Chargers (MUC)
  - Six way
  - Six Radio + Six Battery (TETRA models only)
- Travel Chargers
- Vehicle Chargers

For all the current radio products, the chargers support all three battery chemistries; NiCd, NiMH, and LiION. This is often referred to in product literature as Tri-chemistry capability.

There is also the Impres range which is a smart energy system which automatically reconditions IMPRES batteries based on actual usage, keeping them in peak condition.

Rapid Single Unit Charger

Impres Multi Unit Charger

Rapid Travel Charger

Talk-time and cycle life are optimized and the need for manual maintenance programs is eliminated. In addition, batteries left in the charger are kept fully charged so they are always ready when needed. This rapid-rate, tri-chemistry charging system will also charge compatible non-IMPRES batteries

The Technology

Each Motorola battery charger has the intelligence within it to charge the associated battery the correct way ensuring maximum performance throughout the battery's life

The charger needs to understand the chemistry of the battery it is charging and its capacity. It can then apply the correct charging voltage and current.

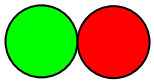
THE DATA MANAGEMENT SOTFWARE

Control entire energy needs from a single point

Charging the battery incorrectly can significantly impact the number of cycles the battery can deliver.

The amount of cycle life reduction will depend on the level of charge current, the higher the current the fewer cycles delivered.

Motorola Charger “Traffic Lights” and what they mean

		Battery is charging
	Flashing	Battery is invalid / faulty
	Flashing	Battery preparing to charge, or out of temperature range
		Reconditioning (Impres chargers only)
	Flashing	Battery is more than 90% charged
		Battery is fully charged
	Flashing Red/Green	Service Life (Impres chargers only)

Impres; Smart Battery Technology

This patented Motorola technology for two-way radio power combines a “smart” battery, a “smart” charger, and a system that lets the battery, charger and other accessory devices communicate. The battery itself has the intelligence to store information such as elapsed usage time, charge and discharge current, voltage and temperature.

INBUILT MICROCHIP IN EVERY IMPRES BATTERY

**Saves battery manufacturing usage data*

**Communicates to charge to optimise*

**Initiates charging and reconditioning*

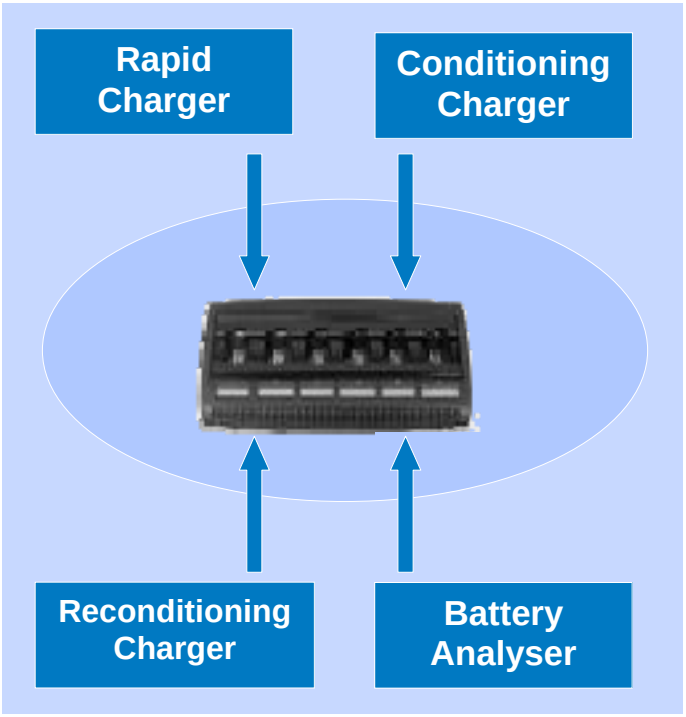
The charger then uses the battery information to control battery maintenance automatically. So the impres system automatically manages battery reconditioning and gauges fuel use to extend battery pack life, extend talk time and improve performance. The impres system works with nickel-cadmium, nickel-metal hydride and lithium-ion batteries.

The impres system is an advanced tri-chemistry energy solution including a smart battery pack, an adaptive single- or multi-unit charger provide automatic, adaptive reconditioning and charging through Motorola's patented hardware and software battery management algorithms. And all you do is put the battery in the charger pocket.

The impres adaptive charger is actually three units in one:

- rapid charger
- conditioning charger
- re-conditioner

4in1 SOLUTION: MOTOROLA IMPRES CHARGER



The battery pack features unique smart circuitry that sends data to the charger. Based on previous charge history stored in the battery, the charger decides whether to charge or to recondition the battery, effectively eliminating memory effect build up.
The charger only reconditions the battery when needed, maximizing talk time and ensuring the most possible charge cycles for the battery pack.
Radios with Impres batteries can be left in the Impres charger constantly without the fear of “cooking” the batteries. This is particularly useful for radios kept on standby for use in emergencies.




Key Features

•Three functions in one; Charger / Conditioner / Re-conditioner
• Automatic Adaptive Reconditioning
– reconditions only when necessary based on the customer usage pattern.
•Advanced charging /trickle/maintenance modes
– advanced algorithms keeps batteries cooler during charging… trickle charge is low current and maintenance mode is zero current with top off bursts keeping the battery fully charged at all times.

•Tri-Chemistry Charging

– supports NiCd, NiMH, and Li-ion battery chemistries.

•Universal Charging – supports multiple two-way radio models in one charger

•“Safe” Battery Stand – batteries can be safely left on the charger for extended periods of time without damage from overheating while keeping the batteries fully charged.

•Revert to Rapid Charging – keeps battery fully charged at all times.

•Charge Resume – resumes rapid charge on batteries briefly removed from the charger.

•Dual LED Alert – Full Charge / End of Service Life – alerts users when a battery is fully charged, but may be near its end of life. This ensures that good batteries are being used in the field.

• Motorola Battery ID Recognition– Smart batteries contain unique IDs and store a multitude of information about the battery, its usage, and its charge characteristics.

• Charges batteries while on or off the radio.

• Smart batteries and chargers operate with older as well as newer Motorola radio platforms.

Professional Series Batteries

Part No	Radio	Description	Dimensions HxWxD (mm)	Weight (g)	Chemistry	Operational Time (hours) 5-5-90 duty cycle	Capacity (mAH)	Intelligent	Number of Charge Cycles	Energy Density (mAH/cm³)	Operating Temperature Range	Memory Effect	Requires Maintenance	Intrinsic Safety Standard
HNN9008	**GP140, GP3x0, GP6x0, GP1280**	Battery NiMH 1400mAH high capacity	120 x 52 x 12	204	NiMH	10	1400 mAH	No	400	18.7	(-20 - +60 deg C)	Yes	Yes	No
HNN9009	**GP140, GP3x0, GP6x0, GP1280**	Battery NiMH 1900mAH ultra high capacity	120 x 52 x 22	215	NiMH	14	1900 mAH	No	400	13.9	(-20 - +60 deg C)	Yes	Yes	No
HNN9010	**GP140, GP3x0, GP6x0, GP1280**	Battery NiMH 1800mAH ultra high capacity FM	120 x 52 x 22	269	NiMH	14	1800 mAH	No	400	13.2	(-20 - +60 deg C)	Yes	Yes	FM
HNN9011	**GP140, GP3x0, GP6x0, GP1280**	Battery NiCd 1550mAH high capacity FM	120 x 52 x 20	226	NiCd	11	1550 mAH	No	650	9.7	(-30 - +60 deg C)	Yes	Yes	FM
HNN9012	**GP140, GP3x0, GP6x0, GP1280**	Battery NiCd 1550mAH high capacity	120 x 52 x 22	228	NiCd	11	1550 mAH	No	650	10.2	(-30 - +60 deg C)	Yes	Yes	No
HNN9013	**GP140, GP3x0, GP6x0, GP1280**	Battery Li-ION 1500mAH ultra high capacity	120 x 52 x12	125	Li-ION	14	1500 mAH	No	400	24.1	(-10 - +60 deg C)	No	No	No
HNN4001	**GP140, GP3x0, GP6x0, GP1280**	Impres battery NiMH 1900mAH ultra high capacity	120 x 52 x 20	280	NiMH	14	1900 mAH	Yes	400	15.3	(-20 - +60 deg C)	Yes	Yes	No
HNN4002	**GP140, GP3x0, GP6x0, GP1280**	Impres battery NiMH 1800mAH ultra high capacity FM	120 x 52 x 20	280	NiMH	14	1800 mAH	Yes	400	14.5	(-20 - +60 deg C)	Yes	Yes	FM
HNN4003	**GP140, GP3x0, GP6x0, GP1280**	Impres battery Li-ION 2000mAH ultra high capacity	120 x 52 x 20	150	Li-ION	16	2000 mAH	Yes	400	16.1	(-10 - +60 deg C)	No	No	No

Professional Series Batteries

Part No	Radio	Description	Dimensions HxWxD (mm)	Weight (g)	Chemistry	Operational Time (hours) 5-5-90 duty cycle	Capacity (mAH)	Intelligent	Number of Charge Cycles	Energy Density (mAH/cm³)	Operating Temperature Range	Memory Effect	Requires Maintenance	Intrinsic Safety Standard
JMNN4023	**Compact; GP344, GP644, GP388, GP688**	Battery Li-ION 1000mAH high capacity	90 x 55 x 15	105	Li-ION	7	1000 mAH	No	400	13.5	(-10 - +60 deg C)	No	No	No
JMNN4024	**Compact; GP344, GP644, GP388, GP688**	Battery Li-ION 1300mAH ultra high capacity	90 x 55 x 20	125	Li-ION	9	1300 mAH	No	400	13.2	(-10 - +60 deg C)	No	No	No
PMNN4073_R	**GP3xxR, GP6xxR**	IP67 Lithium Ion Battery non FM	90.7x55.2x19.5	135	Li-ION	8	1350 mAH	No	400	13.8	(-10 - +60 deg C)	Low	No	Yes
PMNN4074_R	**GP3xxR, GP6xxR**	IP67 Lithium Ion Battery FM	90.7x55.18x19.5	135	Li-ION	8	1400 mAH	No	400	14.3	(-10 - +60 deg C)	Low	No	No
NNTN5510	***Black*** **GP3xxEX, GP5xxEX, GP6xxEX**	Battery Li-ION 1650mAH ultra high capacity ATEX	120 x 52 x 22	228	Li-ION	12	1650 mAH	No	400	12.0	(-10 - +60 deg C)	No	No	ATEX
NNTN7174AR	***Blue*** **GP3xxEX, GP5xxEX, GP6xxEX**	GP PROF SER ATEX Li-ION BATTERY 1480 mAh	124 x 60 x 24.6	230	Li-ION	12	1480 mAH	No	400	7.8	(-10 - +60 deg C)	Low	No	ATEX

Commercial Series Batteries

Part No	Radio	Description	Dimensions HxWxD (mm)	Weight (g)	Chemistry	Operational Time (hours) 5-5-90 duty cycle	Capacity (mAH)	Intelligent	Number of Charge Cycles	Energy Density (mAH/cm³)	Operating Temperature Range	Memory Effect	Requires Maintenance	Intrinsic Safety Standard
NNTN4851	CP040 CP140 CP160 CP180	Battery NiMH 1400mAH	120 x 60 x 22	210	NiMH	10	1400 mAH	No	400	8.84	(-20 - +60 deg C)	Yes	Yes	No
NNTN4852	CP040 CP140 CP160 CP180	Battery NiMH 1300mAH FM	120 x 60 x 22	220	NiMH	9	1300 mAH	No	400	8.20	(-20 - +60 deg C)	Yes	Yes	FM
NNTN4496	CP040 CP140 CP160 CP180	Battery NiCd 1100mAH	120 x 60 x 15	160	NiCd	8	1100 mAH	No	650	10.19	(-30 - +60 deg C)	Yes	Yes	No
NNTN4497	CP040 CP140 CP160 CP180	Battery Li-ION 2250mAH high capacity	120 x 60 x 22	204	Li-ION	18	2250 mAH	No	400	11.36	(-10 - +60 deg C)	No	No	No
NNTN4970	CP040 CP140 CP160 CP180	Battery Li-ION 1600mAHh medium capacity	120 x 60 x 16	134	Li-ION	12	1600 mAH	No	400	13.89	(-10 - +60 deg C)	No	No	No

Legacy Batteries

Part No	Radio	Description	Dimensions HxWxD (mm)	Weight (g)	Chemistry	Operational Time (hours) 5-5-90 duty cycle	Capacity (mAH)	Intelligent	Number of Charge Cycles	Energy Density (mAH/cm³)	Operating Temperature Range	Memory Effect	Requires Maintenance	Intrinsic Safety Standard
PMNN4063	**P020, P030**	Battery NiMH 1300mAH high capacity (Non EU only)	114 x 52 x 16	212	NiMH	8	1300 mAH	No	400	12.65	(-20 - +60 deg C)	Yes	Yes	No
PMNN4018	**P040, P080**	Battery NiMH 1150mAH high capacity FM	120 x 52 x 16	198	NiMH	8	1200 mAH	No	400	12.02	(-20 - +60 deg C)	Yes	Yes	No
PMNN4019	**P040, P080**	Battery NiCd 1100mAH	120 x 52 x 16	198	NiMH	8	1150 mAH	No	400	11.52	(-20 - +60 deg C)	Yes	Yes	FM
HNN8148	**P110**	Battery NiCd 1100mAH high capacity P110	140 x 57 x 16	254	NiCd	8	1100 mAH	No	650	9	(-30 - +60 deg C)	Yes	Yes	No
HNN9628	**GP300**	Battery NiCd 1200mAH high capacity	140 x 57 x 17	210	NiCd	8	1200 mAH	No	650	9	(-30 - +60 deg C)	Yes	Yes	No

MOTOTRBO Batteries

Part No	Radio	Description	Dimensions HxWxD (mm)	Weight (g)	Chemistry	Operational Time (hours)	Capacity (mAH)	Intelligent	Number of Charge Cycles	Energy Density (mAH/cm³)	Operating Temperature Range	Memory Effect	Requires Maintenance	Requires Maintenance
PMNN4065	**DP34XX, DP36XX**	NiMH 1300 mAh Battery	129.3x55.1x20.6	215	NiMH	Analog- 8hr Digital- 11.2hr	1300 mAh	No	500	8.86	(-20 - +60 deg C)	Low	Yes	No
PMNN4066	**DP34XX, DP36XX**	Impres Li-Ion 1500 mAH Battery	129.3x55.1x18.7	145	LiIon	Analog- 9.3hr Digital- 13hr	1500 mAh	YES	400	11.26	(-10 - +60 deg C)	None	Yes	No
PMNN4069	**DP34XX, DP36XX**	Impres Li-Ion 1400 mAH FM Battery	129.3x55.1x20.6	155	LiIon	Analog- 8.7hr Digital - 12.1hr	1400 mAh	YES	400	9.54	(-10 - +60 deg C)	None	Yes	No
PMNN4077	**DP34XX, DP36XX**	Li-Ion 2200 mAH Impress battery	129.3x55.1x22.7	160	LiIon	Analog- 13.5hr Digital- 19hr	2200 mAh	YES	300	13.60	(-10 - +60 deg C)	None	Yes	No

Chargers: GP Professional, GP Professional Atex, GP Compact and GP Compact R

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Line Cord	Display	Charger Type
WPLN4189	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres multi unit charger, 230V Euro Power Cord (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.6	Li-ION/NiCd/NiMH	6	Yes	230V	Euro	Option	Impres
WPLN4188	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres multi unit charger, 230V UK Power Cord (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.6	Li-ION/NiCd/NiMH	6	Yes	230V	UK	Option	Impres
WPLN4205	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres multi unit charger, 120V US Power Cord (not CE compliant) (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.6	Li-ION/NiCd/NiMH	6	Yes	120V	US	Option	Impres
WPLN4194	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres display multi unit charger, 230V Euro Power Cord (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	230V	Euro	Yes	Impres
WPLN4193	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres display multi unit charger, 230V UK Power Cord (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	230V	UK	Yes	Impres
WPLN4204	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres display multi unit charger, 120V US Power Cord (not CE compliant) (Requires charger adapter PMLN5010 for use with GP Compact Ruggedised)	152 x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	120V	US	Yes	Impres
MDRLN4883	**GP140, GP3x0, GP6x0, Compact, ATEX**	Travel charger with VPA adapter and coiled cable	55 x 35 x 60	0.2	Li-ION/NiCd/NiMH	1	No	- 32 V	Other	No	Rapid

Chargers: GP Professional, GP Professional Atex, GP Compact and GP Compact R

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Line Cord	Display	Charger Type
WPLN4184	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres single unit charger, 230V Euro Power Cord	55 x 95 x 150	0.2	Li-ION/NiCd/NiMH	1	Yes	230V	Euro	No	Impres
WPLN4183	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres single unit charger, 230V UK Power Cord	55 x 95 x 150	0.2	Li-ION/NiCd/NiMH	1	Yes	230V	UK	No	Impres
WPLN4206	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Impres single unit charger, 120V US Power Cord (not CE compliant)	55 x 95 x 150	0.2	Li-ION/NiCd/NiMH	1	Yes	120V	US	No	Impres
MDHTN3001	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Rapid single unit charger, 230V Euro Power Cord	50 x 110 x 100	0.4	Li-ION/NiCd/NiMH	1	No	230V	Euro	No	Rapid
MDHTN3002	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Rapid single unit charger, 230V UK Power Cord	50 x 110 x 100	0.4	Li-ION/NiCd/NiMH	1	No	230V	UK	No	Rapid
MDHTN3000	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Rapid single unit charger, 120V US Power Cord (not CE compliant)	50 x 110 x 100	0.4	Li-ION/NiCd/NiMH	1	No	120V	US	No	Rapid
MDHTN9000	**GP140, GP3x0, GP6x0, Compact, GP-R, ATEX**	Single Unit Rapid Charger Pocket									

Commercial Series Chargers

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Line Cord	Display	Charger Type
WPLN4162	**CP040, CP140, CP160, CP180**	Multi unit charger with six stations, 220V Euro	25 x 400 x 300	2.4	Li-ION/NiCd/NiMH	6	No	220V	Euro	No	Rapid
WPLN4163	**CP040, CP140, CP160, CP181**	Multi unit charger with six stations, 220V UK	25 x 400 x 300	2.4	Li-ION/NiCd/NiMH	6	No	220V	UK	No	Rapid
WPLN4161	**CP040, CP140, CP160, CP182**	Multi unit charger with six stations, 120V US (not CE compliant)	25 x 400 x 300	2.4	Li-ION/NiCd/NiMH	6	No	120V	US	No	Rapid
WPLN4139	**CP040, CP140, CP160, CP183**	Rapid single unit charger, 230V Euro	50 x 100 x110	0.4	Li-ION/NiCd/NiMH	1	No	230V	Euro	No	Rapid
WPLN4140	**CP040, CP140, CP160, CP184**	Rapid single unit charger, 230V UK	50 x 100 x110	0.4	Li-ION/NiCd/NiMH	1	No	230V	UK	No	Rapid
WPLN4138	**CP040, CP140, CP160, CP185**	Rapid single unit charger, 120V US (Not CE compliant)	50 x 100 x110	0.4	Li-ION/NiCd/NiMH	1	No	120V	US	No	Rapid

Legacy Chargers

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Line Cord	Display	Charger Type
WPLN4109	**GP900, GP1200, VISAR**	Impres multi unit charger universal, 230V Euro	152 x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	230V	Euro	Option	Impres
WPLN4110	**GP900, GP1200, VISAR**	Impres multi unit charger universal, 230V UK	152x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	230V	UK	Option	Impres
WPLN4120	**GP900, GP1200, VISAR**	Impres multi unit charger universal, 120V US (not CE compliant)	152x 450 x 300	3.7	Li-ION/NiCd/NiMH	6	Yes	120V	US	Option	Impres
WPLN4131	**GP900, GP1200, VISAR**	Impres display multi unit charger universal, 230V Euro	152x 450 x 300	3.9	Li-ION/NiCd/NiMH	6	Yes	230V	Euro	Yes	Impres
WPLN4132	**GP900, GP1200, VISAR**	Impres display multi unit charger universal, 230V UK	152x 450 x 300	3.9	Li-ION/NiCd/NiMH	6	Yes	230V	UK	Yes	Impres
WPLN4135	**GP900, GP1200, VISAR**	Impres display multi unit charger universal, 120V US (not CE compliant)	152x 450 x 300	3.9	Li-ION/NiCd/NiMH	6	Yes	120 V	US	Yes	Impres
NTN1669	**GP900, GP1200, VISAR**	Rapid single unit charger, 230V UK	65 x 110 x 100	0.4	Li-ION/NiCd/NiMH	1	No	230V	UK	No	Rapid
WPLN4112	**GP900, GP1200, VISAR**	Universal impres single unit charger, 230V Euro	80 x 100 x 200	0.6	Li-ION/NiCd/NiMH	1	Yes	230V	Euro	No	Impres
WPLN4113	**GP900, GP1200, VISAR**	Universal impres single unit charger, 230V UK	80 x 100 x 200	0.6	Li-ION/NiCd/NiMH	1	Yes	230V	UK	No	Impres

Legacy Chargers

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Line Cord	Display	Charger Type
WPLN4117	**GP900, GP1200, VISAR**	Universal impres single unit charger, 120V US (not CE compliant)	80 x 100 x 200	0.6	Li-ION/NiCd/NiMH	1	Yes	120 V	US	No	Impres
RLN5220	**P040, P080**	Multi unit charger with six stations, 220/240V Euro	25 x 400 x 300	2.4	NiCd/NiMH	6	No	220/240 V	Euro	No	Rapid
RLN5219	**P040, P081**	Multi unit charger with six stations, 220/240V UK	25 x 400 x 300	2.4	NiCd/NiMH	6	No	220/240 V	UK	No	Rapid
RLN5218	**P040, P082**	Multi unit charger with six stations, 110 V US (not CE compliant)	25 x 400 x 300	2.4	NiCd/NiMH	6	No	110V	US	No	Rapid
MDPMTN4088	**P020, P030**	Rapid single unit charger, 220V Euro (Not CE compliant)	55 x 100 x 110	0.4	NiCd/NiMH	1	No	220V	Euro	No	Rapid
MDPMTN4089	**P020, P031**	Rapid single unit charger, 220V UK (Not CE compliant)	55 x 100 x 110	0.4	NiCd/NiMH	1	No	220V	UK	No	Rapid
MDPMTN4087	**P020, P032**	Rapid single unit charger, 120V US (not CE compliant)	55 x 100 x 110	0.4	NiCd/NiMH	1	No	120 V	US	No	Rapid
MDHTN9043	**GP300, P110**	Rapid single unit charger, 230V Euro	100 x 110 x 100	0.4	NiCd/NiMH	1	No	230 V	Euro	No	Rapid
MDHTN9044	**GP300, P110**	Rapid single unit charger, 240V UK	100 x 110 x 100	0.4	NiCd/NiMH	1	No	240V	UK	No	Rapid
MDHTN9042	**GP300, P110**	Rapid single unit charger, 110V US (not CE compliant)	100 x 110 x 100	0.4	NiCd/NiMH	1	No	110V	US	No	Rapid

Mototrbo Chargers

DP3400, DP3401, DP3600 & DP3601

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Display	Charger Type
WPLN4232	**DP34xx, DP36xx**	Impres Single Unit Charger **(US power supplier)**	52.6x96.6x147.4	195	NiCd / NiMH / LiIon	1	Yes	110	Option	Impres
WPLN4233	**DP34xx, DP36xx**	Impres Single Unit Charger (UK power supplier)	52.6x96.6x147.4	195	NiCd / NiMH / LiIon	1	Yes	230	Option	Impres
WPLN4234	**DP34xx, DP36xx**	Impres Single Unit Charger (EU power supplier)	52.6x96.6x147.4	195	NiCd / NiMH / LiIon	1	Yes	220-240	Option	Impres
WPLN4226	**DP34xx, DP36xx**	Impres single Unit Charger Base Only	52.6x96.6x147.4	195	NiCd / NiMH / LiIon	1	Yes	N/A	Option	Impres
WPLN4225	**DP34xx, DP36xx**	Core SUC Base only								
WPLN4212	**DP34xx, DP36xx**	Impres Multi Unit Charger US Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	NO	Impres
WPLN4213	**DP34xx, DP36xx**	Impres Multi Unit Charger Euro Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	NO	Impres
WPLN4214	**DP34xx, DP36xx**	Impres Multi Unit Charger UK Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	NO	Impres

Mototrbo Chargers

DP3400, DP3401, DP3600 & DP3601

Part No	Radios	Description	Dimensions HxWxD (mm)	Weight (Kg)	Chemistry	Number of Pockets	Maintenance System	Operating Voltage AC	Display	Charger Type
WPLN4219	**DP34xx, DP36xx**	Impres Multi Unit Charger with display US Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Y	100-240	YES	Impres
WPLN4220	**DP34xx, DP36xx**	Impres Multi Unit Charger with display Euro Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Y	100-240	YES	Impres
WPLN4221	**DP34xx, DP36xx**	Impres Multi Unit Charger with display UK Plug	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	YES	Impres
WPLN4239	**DP34xx, DP36xx**	Impres Multi Unit Charger US 1-Up Display	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	YES (1 only)	Impres
WPLN4211	**DP34xx, DP36xx**	Impres Multi Unit Charger Base Only	157.6X445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	NO	Impres
WPLN4218	**DP34xx, DP36xx**	Impres Multi Unit Charger with Display Base Only	157.6x445x287.9	3.75kg	NiCd / NiMH / LiIon	6	Yes	100-240	YES	Impres

Glossary

Memory Effect

Memory effect, also known as lazy battery effect or battery memory, is an effect observed in nickel cadmium rechargeable batteries that causes them to hold less charge. It describes one very specific situation in which certain NiCd batteries gradually lose their maximum energy capacity if they are repeatedly recharged after being only partially discharged. The battery appears to "remember" the smaller capacity.

Shelf life

A unique drawback of the Li-ion battery is that its service life is dependent upon aging (shelf life). From time of manufacturing, regardless of whether it was charged or the number of charge/discharge cycles, the battery will decline slowly and predictably in "capacity". This means an older battery will not last as long as a new battery due solely to its age, unlike other batteries. This is due to an increase in internal resistance, which affects its ability to deliver current, thus the problem is more pronounced in high-current applications than low.

Self Discharge

Self-discharge is a phenomenon in batteries in which internal chemical reactions reduce the stored charge of the battery without any connection between the electrodes. Self-discharge decreases the time batteries can be left before they are put into operation.

How fast self-discharge in a battery occurs is dependent on the type of battery. Typically, lithium batteries suffer the least amount of self-discharge (around 2-3% discharge per month), while nickel-based batteries are more seriously affected by the phenomenon (nickel cadmium, 15-20% per month; nickel metal hydride, 30% per month).

This may be accelerated with protection circuitry within the battery.

Operational Time

Operational time expressed in hours is the amount of time a fully charged battery will last before requiring to be re-charged. It assumes that the radio is transmitting at the highest power level, and that a usage pattern, of 5% of the time in Transmit, 5% of the time in receive and 90% of the time in standby. This is also referred to as a 5-5-90 Duty Cycle in data sheets.

Usefull Links

General

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