HOPPECKE
POWER FROM INNOVATION

rail | Nickel-Cadmium

Powerful batteries for
rail applications

www.hoppecke.com

Reach your destination safely with HOPPECKE

Safety and reliability in rail transport even under extreme conditions. Be on the safe side with proven nickel-cadmium technology. Extreme environmental and operating conditions are challenging the railway industry to guarantee full functional availability, even under adverse temperature conditions, to ensure safe travel at all times. NiCd technology has the reliability, fail safe performance and robustness to provide exactly what is essential for rail vehicles under extreme outdoor conditions. Their wide range of operating temperatures allows nickel-cadmium batteries remain safe to use even under extremely cold as well as hot outside temperatures, so that emergency power supply is assured at all times. Based on years of experience, HOPPECKE has been able to develop and continuously improve to provide you with the solution you need. We equip your rail vehicles that they are absolutely safe in emergency power operation and maximum performance is guaranteed when starting diesel engines or given additional requirements. HOPPECKE enables you to always rely on your rolling stock safely reaching its destination.

CERTIFICATIONS

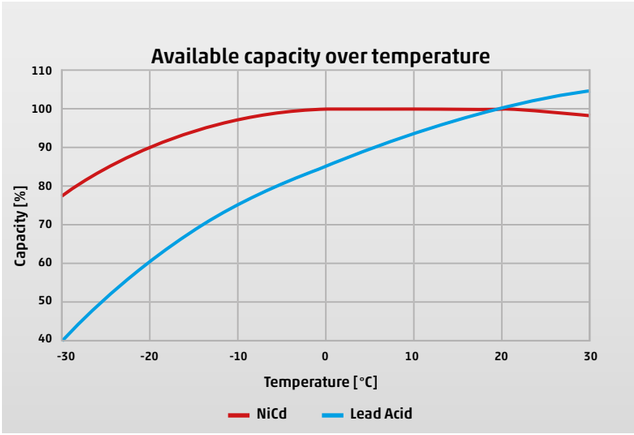
Quality, safety and environment

All our NiCd batteries meet the necessary requirements of the relevant standards, such as IEC60623 and IEC61373.

Temperature behaviour
Their electrochemistry allows NiCd batteries to offer excellent temperature characteristics. Even at extremely low temperatures, they still supply energy reliably. Since the electrolyte does not participate in the battery's reaction and only acts as an ion conductor, it's density does not change with the state of charge. So there is no risk of freezing even when stored in low charge conditions. These are features that make this technology indispensable, especially for applications under very cold climatic conditions. Also at high temperatures, the technology performes well. Battery ageing does not increase disproportionately and long service lives are possible even under warm ambient conditions.

Service life
NiCd cells are not subject to many ageing effects, such as corrosion. So they also achieve very high calendar service lives in practice. An operating life of over 15 years is common even in tough rolling stock applications. This saves the user many inconvenient and expensive battery changes. NiCd batteries are also ahead in terms of cycle stability. HOPPECKE FNC technology in particular is unique here and excels with well over 3000 achievable standard cycles.

Unbeatable robustness
NiCd technology is a very robust and reliable technology in everyday use. It can also easily cope with occasional mishandling such as overcharging. Even storage in an uncharged condition is not a problem. Error patterns such as thermal runaway and sudden failure do not occur. A guarantee for safe operation, even if the conditions are sometimes not optimal.



Fibre structure technology (FNC)

rail | power FNC

Fibre-nickel-cadmium technology (FNC) is a technology developed by HOPPECKE, which particulary convinces by its reliable and universal use in the railway industry. FNC technology is flexible and available in a wide range of capacity and performance classes. FNC batteries can be used for a very long time, which reduces replacement costs to a minimum.

DNV GL

TYPE APPROVED PRODUCT DNV·GL MARITIME

Certificate TAE000032C

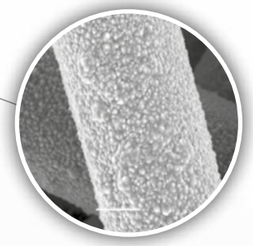
Tried and tested for a long time.

In service for over 35 years.

Developed by your energy experts at HOPPECKE.

The basis of fibre structure technology is a metallised fibre fleece. This results in a three-dimensional, highly porous, yet highly conductive electrical structure in which the active mass is placed via a special process. The firm mechanical bonding of the active mass and high flexibility of the electrode result in the extreme resistance and service life for which FNC technology has been known for decades. No other NiCd technology on the market allows a comparably high number of discharge cycles!

Varying the initial thickness of the fleece makes it possible to produce electrodes of different thicknesses and enables batteries to be manufactured over a wide range from energy-optimised L and M types to performance-oriented H and X types. At the same time, the rest of the battery design is also adaptable. This enables us to respond to very specific customer requirements when necessary. FNC batteries are available with different casing materials (PP, PP-V0, PES) to meet the differing global requirements regarding fire protection.



Metallised fibres
under a scanning electron microscope

FNC batteries – optimised for use as an on-board battery:

- In regional trains
- In high-speed trains
- In locomotives
- In metros
- In trams/light rail vehicles

Your benefits
rail | power FNC

- Very high cycle stability
- Very variable and flexible
- Wide operating temperature range
- Long-proven reliability

High-temperature fibre structure technology (FNC)

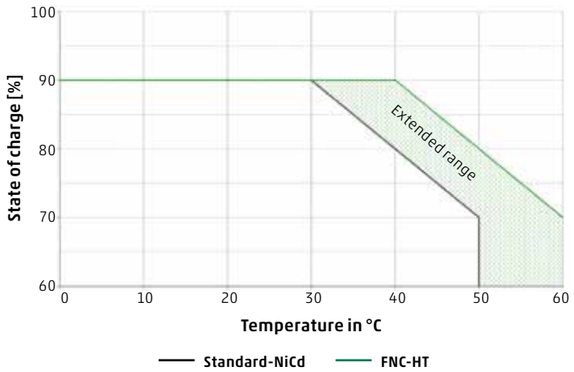
rail | power FNC-HT

When used in certain regions of the world („hot countries"), NiCd batteries are required to operate at permanently high ambient temperatures. Under these conditions conventional batteries suffer from accelerated ageing, poor charge acceptance and premature degradation of capacity. Due to this, batteries for high temperature application had to be significantly oversized, until now. By using FNC-HT batteries, this oversizing can be kept to a minimum, with direct advantages in terms of weight, installation space and costs. At the same time, the maintenance effort can be reduced compared to conventional batteries and the service life is extended.

Optimum performance
while others break into a sweat.

With the FNC-HT series the proven FNC technology has been specially adapted for use under permanently hot climatic conditions. Proven design features have been retained and experiences gained from many successful warm applications could be incorporated. The already good temperature resistance of the HOPPECKE FNC batteries has been further improved by the use of a special electrolyte, which shifts the range of operation to significantly higher temperatures.

Chargeability over temperature*



*Example: Exact sizing factors have to be selected acc. the project-specific conditions in consultation with HOPPECKE.

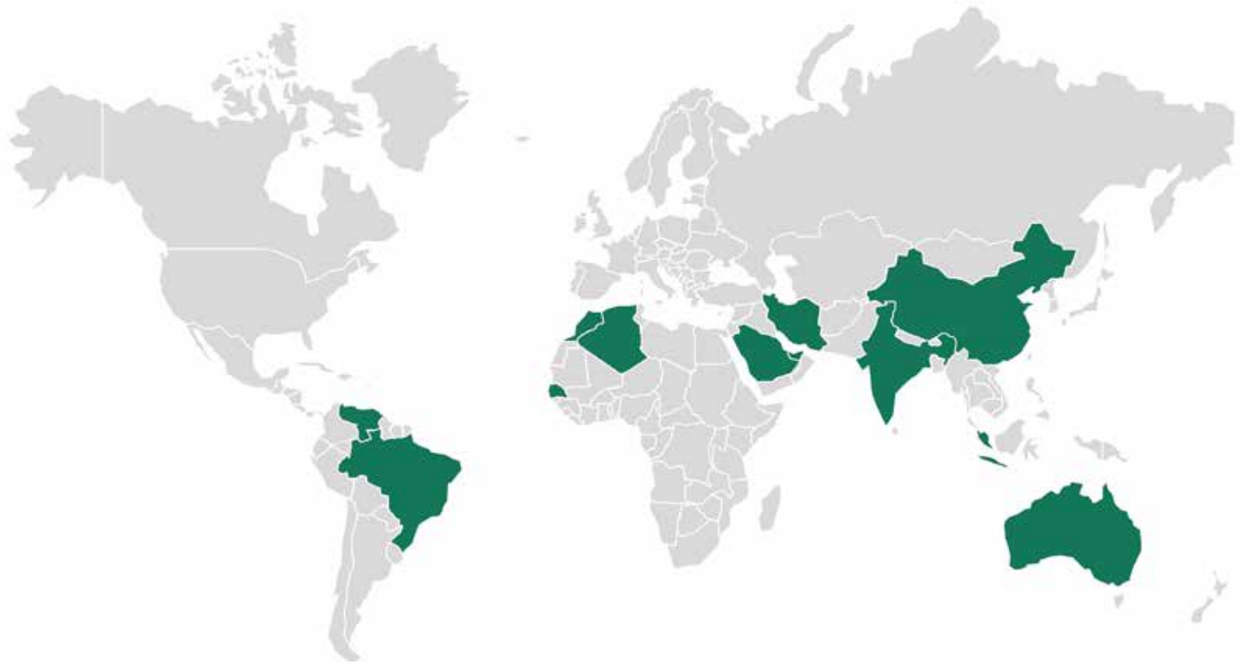
FNC-HT Technologie –
a hot solution for:

- Permanently warm applications
- Large temperature loads
- Continuous tunnel operation

Your benefits
rail | power FNC-HT

- Extended temperature range
- Less oversizing
- Longer service life
- Reduced maintenance effort

Examples of hot countries with projects already realised by HOPPECKE:



Sinter / PBE technology

rail | power HNCS

You need high performance within seconds in an emergency case? HOPPECKE offers you exactly the solution you need with its powerful and compact batteries in sinter/PBE technology. These batteries have a compact and lightweight design and offer high performance while saving up to 30 % space compared to comparable batteries. Our low-maintenance batteries deliver excellent performance even under extreme temperature conditions. Their space and weight savings offer more room for passengers and thus provide more payload without neglecting comfort or safety.

Top support from our engineers in each project phase.

Sinter technology
is used mainly in:

- Applications with very high power requirements, e. g. emergency traction
- Trams and high-speed trains to supply electromagnetic rail brakes
- All other high performance applications

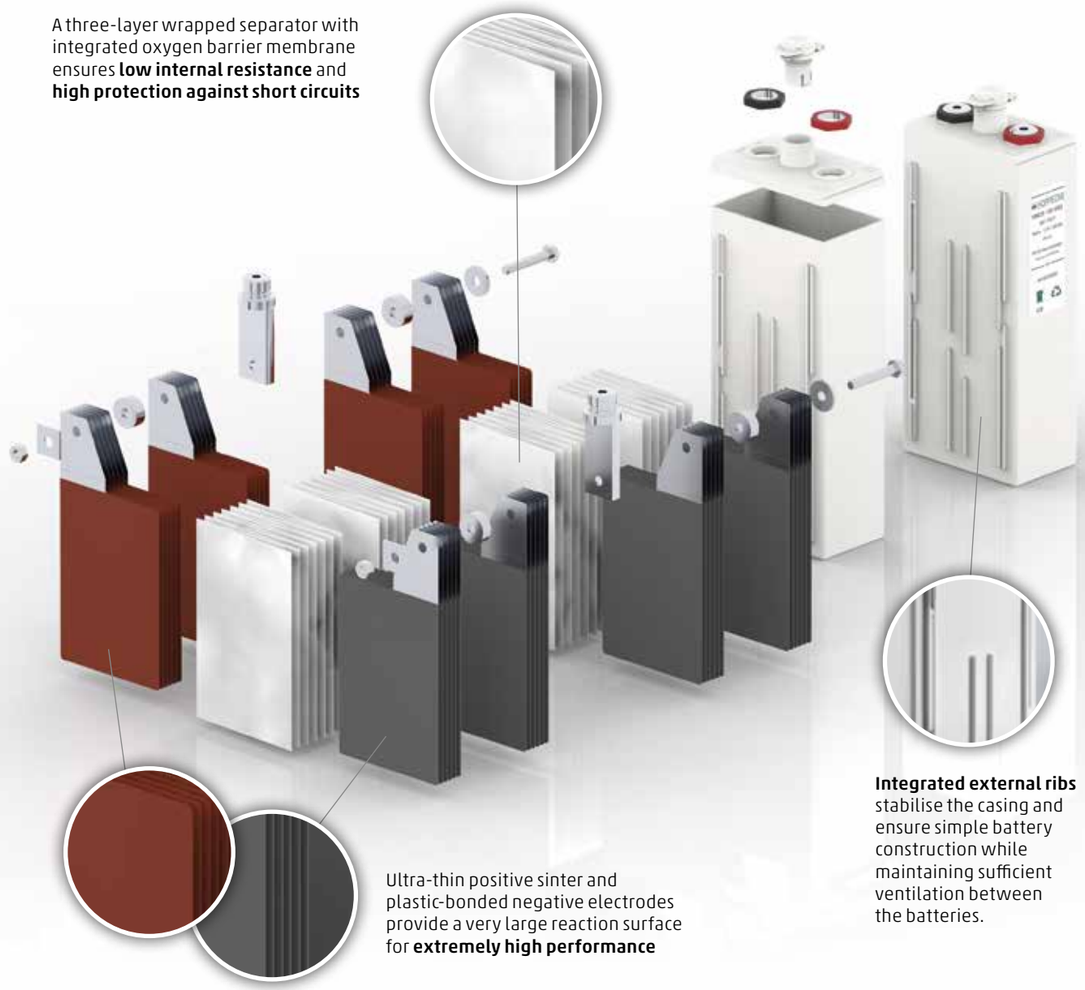
Your benefits
rail | power HNCS

- Extreme power
- High energy density
- Greater payload possible due to lower weight
- Wide operating temperature range
- Low maintenance

With HNCS cells, HOPPECKE is adopting the sinter/ PBE technology established on the market for many years and taking it to a new level. The single cells use very thin sintered electrodes on the positive side and plastic-bonded electrodes on the negative side.

These are combined with a very thin but very resistant separator to produce compact NiCd batteries with high energy and power density coupled with high reliability in energy storage.

A three-layer wrapped separator with integrated oxygen barrier membrane ensures **low internal resistance** and **high protection against short circuits**



Integrated external ribs stabilise the casing and ensure simple battery construction while maintaining sufficient ventilation between the batteries.

Ultra-thin positive sinter and plastic-bonded negative electrodes provide a very large reaction surface for **extremely high performance**

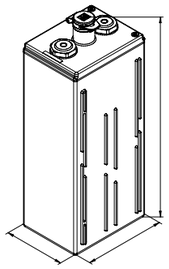
HOPPECKE
POWER FROM INNOVATION

Technical data

rail | power HNCS

	C_5 [Ah]	Length** [mm]	Width [mm]	Height [mm]	Weight [kg]
HNCS 130 XR2	130	77	122	309	5.05
HNCS 165 XR2	165	97	122	309	6.40
HNCS 190 XR2	190	97	122	309	6.65
HNCS 230 XR2	230	309	122	120	8.35

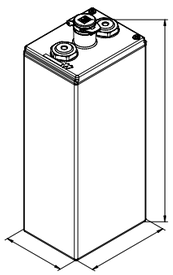
** including external ribs



rail | power FNC-HT H

	C_5 [Ah]	Length* [mm]	Width [mm]	Height [mm]	Weight [kg]
FNC-HT 38 HR2	38	122	39	309	2.30
FNC-HT 50 HR2	50	122	47	309	2.80
FNC-HT 65 HR2	65	122	58	309	3.40
FNC-HT 75 HR2	75	122	72	309	4.15
FNC-HT 90 HR2	90	122	72	309	4.30
FNC-HT 105 HR2	105	122	92	309	5.40
FNC-HT 115 HR2	115	122	92	309	5.60
FNC-HT 125 HR2	125	122	115	309	6.65
FNC-HT 140 HR2	140	122	115	309	6.95
FNC-HT 150 HR2	150	122	115	309	7.10
FNC-HT 155 HR3	155	194	92	309	8.45
FNC-HT 160 HR3	160	194	92	309	8.75
FNC-HT 175 HR3	175	194	92	309	8.75
FNC-HT 180 HR3	180	194	92	309	9.00
FNC-HT 195 HR3	195	194	92	309	9.05
FNC-HT 200 HR3	200	194	115	309	10.85
FNC-HT 220 HR3	220	194	115	309	10.90
FNC-HT 240 HR3	240	194	115	309	11.15
FNC-HT 265 HR3	265	194	115	309	11.50

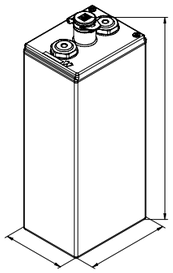
* Dimensions apply to PP casing material. Other materials may deviate.



rail | power FNC-HT M

	C_5 [Ah]	Length* [mm]	Width [mm]	Height [mm]	Weight [kg]
FNC-HT 40 MR2	40	122	39	309	2.20
FNC-HT 60 MR2	60	122	47	309	2.80
FNC-HT 85 MR2	85	122	58	309	3.35
FNC-HT 105 MR2	105	122	72	309	4.20
FNC-HT 125 MR2	125	122	92	309	5.40
FNC-HT 145 MR2	145	122	92	309	5.65
FNC-HT 165 MR2	165	122	115	309	6.75
FNC-HT 190 MR2	190	122	115	309	7.00
FNC-HT 210 MR3	210	194	92	309	8.85
FNC-HT 225 MR3	225	194	92	309	8.85
FNC-HT 245 MR3	245	194	92	309	9.00
FNC-HT 250 MR3	250	194	115	309	10.50
FNC-HT 280 MR3	280	194	115	309	10.70
FNC-HT 285 MR3	285	194	115	309	11.20
FNC-HT 320 MR3	320	194	115	309	11.45

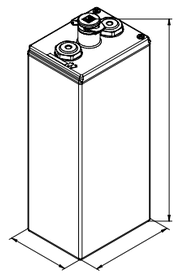
* Dimensions apply to PP casing material. Other materials may deviate.



rail | power FNC X

	C_5 [Ah]	Length* [mm]	Width* [mm]	Height* [mm]	Weight [kg]
FNC 25 XR2	25	39	122	309	2.40
FNC 40 XR2	40	47	122	309	2.95
FNC 45 XR2	45	58	122	309	3.60
FNC 65 XR2	65	72	122	309	4.55
FNC 90 XR2	90	92	122	309	6.00
FNC 115 XR2	115	115	122	309	7.50
FNC 130 XR3	130	92	194	309	9.00
FNC 140 XR3	140	92	194	309	9.30
FNC 155 XR3	155	92	194	309	9.55
FNC 165 XR3	165	115	194	309	11.20
FNC 175 XR3	175	115	194	309	11.50
FNC 190 XR3	190	115	194	309	11.75
FNC 200 XR3	200	115	194	309	12.10

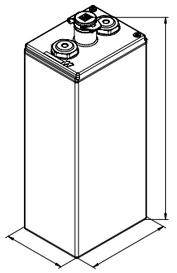
* Dimensions apply to PP casing material. Other materials may deviate.



rail | power FNC H

	C_5 [Ah]	Length* [mm]	Width* [mm]	Height* [mm]	Weight [kg]
FNC 35 HR2	35	39	122	309	2.30
FNC 38 HR2	38	39	122	309	2.30
FNC 45 HR2	45	47	122	309	2.80
FNC 50 HR2	50	47	122	309	2.80
FNC 58 HR2	58	58	122	309	3.40
FNC 65 HR2	65	58	122	309	3.40
FNC 70 HR2	70	72	122	309	4.15
FNC 75 HR2	75	72	122	309	4.15
FNC 80 HR2	80	72	122	309	4.30
FNC 90 HR2	90	72	122	309	4.30
FNC 95 HR2	95	92	122	309	5.40
FNC 105 HR2	105	92	122	309	5.40
FNC 115 HR2	115	92	122	309	5.60
FNC 125 HR2	125	115	122	309	6.65
FNC 140 HR2	140	115	122	309	6.95
FNC 150 HR2	150	115	122	309	7.10
FNC 140 HR3	140	92	194	309	8.45
FNC 155 HR3	155	92	194	309	8.45
FNC 160 HR3	160	92	194	309	8.75
FNC 175 HR3	175	92	194	309	8.75
FNC 180 HR3	180	92	194	309	9.00
FNC 195 HR3	195	92	194	309	9.05
FNC 200 HR3	200	115	194	309	10.85
FNC 220 HR3	220	115	194	309	10.90
FNC 240 HR3	240	115	194	309	11.15
FNC 265 HR3	265	115	194	309	11.50

* Dimensions apply to PP casing material. Other materials may deviate.

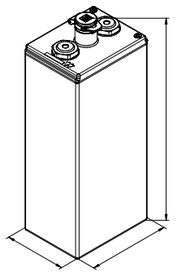


HOPPECKE
POWER FROM INNOVATION

Technical data

rail | power FNC M

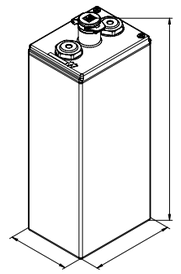
	C_5 [Ah]	Length** [mm]	Width** [mm]	Height** [mm]	Weight [kg]
FNC 40 MR2	40	39	122	309	2.20
FNC 45 MR2	45	39	122	309	2.20
FNC 60 MR2	60	47	122	309	2.80
FNC 65 MR2	65	47	122	309	2.80
FNC 80 MR2	80	58	122	309	3.35
FNC 90 MR2	90	58	122	309	3.35
FNC 100 MR2	100	72	122	309	4.15
FNC 110 MR2	110	72	122	309	4.20
FNC 120 MR2	120	92	122	309	5.35
FNC 130 MR2	130	92	122	309	5.40
FNC 140 MR2	140	92	122	309	5.60
FNC 155 MR2	155	92	122	309	5.65
FNC 160 MR2	160	115	122	309	6.65
FNC 175 MR2	175	115	122	309	6.75
FNC 180 MR2	180	115	122	309	6.90
FNC 200 MR2	200	115	122	309	7.00
FNC 200 MR3	200	92	194	309	8.70
FNC 220 MR3	220	92	194	309	8.85
FNC 235 MR3	235	92	194	309	8.85
FNC 260 MR3	260	92	194	309	9.00
FNC 265 MR3	265	115	194	309	10.50
FNC 295 MR3	295	115	194	309	10.70
FNC 300 MR3	300	115	194	309	11.20
FNC 335 MR3	335	115	194	309	11.45
FNC 150 MR4	150	77	157.5	405	7.70
FNC 160 MR4	160	77	157.5	405	7.75
FNC 185 MR4	185	77	157.5	405	7.80
FNC 200 MR4	200	77	157.5	405	7.90
FNC 225 MR4	225	109	157.5	405	10.35
FNC 240 MR4	240	109	157.5	405	10.50
FNC 265 MR4	265	109	157.5	405	10.90
FNC 280 MR4	280	109	157.5	405	11.10
FNC 300 MR4	300	109	157.5	405	11.65
FNC 320 MR4	320	109	157.5	405	11.85
FNC 340 MR4	340	125	157.5	405	13.10
FNC 360 MR4	360	125	157.5	405	13.30
FNC 375 MR4	375	125	157.5	405	13.55
FNC 400 MR4	400	125	157.5	405	13.80
FNC 415 MR4	415	157	157.5	405	16.05
FNC 440 MR4	440	157	157.5	405	16.25
FNC 450 MR4	450	157	157.5	405	16.55
FNC 480 MR4	480	157	157.5	405	16.85
FNC 490 MR4	490	157	157.5	405	17.10



** Dimensions apply to PP casing material. Other materials may deviate.

rail | power FNC L

	C_5 [Ah]	Length** [mm]	Width** [mm]	Height** [mm]	Weight [kg]
FNC 40 LR2	40	39	122	309	2.15
FNC 45 LR2	45	39	122	309	2.15
FNC 60 LR2	60	47	122	309	2.65
FNC 65 LR2	65	47	122	309	2.65
FNC 80 LR2	80	58	122	309	3.25
FNC 90 LR2	90	58	122	309	3.25
FNC 100 LR2	100	72	122	309	4.10
FNC 110 LR2	110	72	122	309	4.10
FNC 120 LR2	120	72	122	309	4.25
FNC 130 LR2	130	72	122	309	4.25
FNC 140 LR2	140	92	122	309	5.35
FNC 155 LR2	155	92	122	309	5.40
FNC 160 LR2	160	92	122	309	5.50
FNC 175 LR2	175	92	122	309	5.55
FNC 180 LR2	180	115	122	309	6.40
FNC 200 LR2	200	115	122	309	6.45
FNC 220 LR2	220	115	122	309	6.80
FNC 200 LR3	200	92	194	309	8.45
FNC 220 LR3	220	92	194	309	8.50
FNC 235 LR3	235	92	194	309	8.75
FNC 260 LR3	260	92	194	309	8.80
FNC 265 LR3	265	92	194	309	8.90
FNC 295 LR3	295	92	194	309	8.95
FNC 300 LR3	300	115	194	309	10.90
FNC 335 LR3	335	115	194	309	11.00
FNC 370 LR3	370	115	194	309	11.10
FNC 150 LR4	150	77	157.5	405	7.35
FNC 160 LR4	160	77	157.5	405	7.40
FNC 185 LR4	185	77	157.5	405	7.60
FNC 200 LR4	200	77	157.5	405	7.65
FNC 225 LR4	225	77	157.5	405	7.80
FNC 240 LR4	240	109	157.5	405	10.35
FNC 265 LR4	265	109	157.5	405	10.80
FNC 280 LR4	280	109	157.5	405	10.90
FNC 300 LR4	300	109	157.5	405	11.10
FNC 320 LR4	320	109	157.5	405	11.20
FNC 340 LR4	340	109	157.5	405	11.40
FNC 360 LR4	360	109	157.5	405	11.55
FNC 375 LR4	375	125	157.5	405	12.55
FNC 400 LR4	400	125	157.5	405	12.70
FNC 415 LR4	415	125	157.5	405	12.90
FNC 440 LR4	440	125	157.5	405	13.05
FNC 450 LR4	450	157	157.5	405	15.90
FNC 480 LR4	480	157	157.5	405	16.10
FNC 490 LR4	490	157	157.5	405	16.30
FNC 520 LR4	520	157	157.5	405	16.50
FNC 525 LR4	525	157	157.5	405	16.70
FNC 560 LR4	560	157	157.5	405	16.90



** Dimensions apply to PP casing material. Other materials may deviate.

HOPPECKE
POWER FROM INNOVATION

HOPPECKE Batterie Systeme GmbH
Bontkirchener Str. 1
59929 Brilon
Tel.: +49 (0) 2963 61-1423
Fax: +49 (0) 2963 61-1451
E-Mail: hbs@hoppecke.com

Use this to access our product overview in the rail sector.

www.hoppecke.com

05/2024 EN rail | Nickel-Cadmium