



SIEMENS

Ingenuity for life

Building on the Strengths
of Today with the
Innovations of Tomorrow

High-Floor Light Rail Vehicles

usa.siemens.com/mobility



1 LIGHT RAIL has the ability to replace **920 CARS**



off the road



Connecting Neighborhoods

Light rail systems move passengers to their destinations faster and in more comfort, allowing them to skip traffic congestion and reduce air pollution. Siemens new high floor vehicles will better connect neighborhoods with city centers, making travel easy, reliable and affordable.

The new S200 high-floor light rail vehicle is electrically powered from an overhead wire system (catenary) and operates at speeds up to 65 miles per hour with the ability to operate in multiple vehicle consists. Carrying upwards of 200 passengers in each vehicle, light rail transit is an effective mode of decreasing automobiles on roadways, reducing CO₂ emissions and improving commuters' experience.

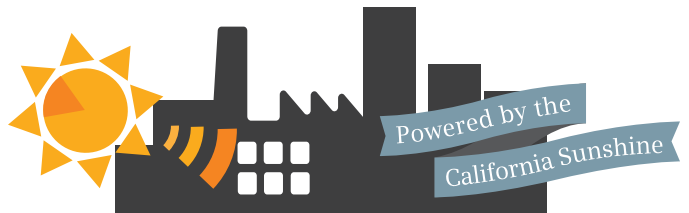
The Evolution of High-Floor Light Rail Vehicles

The S200 represents all that we have learned – throughout 30 years of manufacturing high floor vehicles in the United States – in addition to what we have learned from our other light rail projects around the world. It is a hybrid creation combining industry leading innovations with the best elements from both of our successful SD160 high-floor and S70 low-floor light rail platforms.

A Cleaner, Greener Way to Travel

Reduced traffic congestion translates into lower levels of pollution and a higher quality of life.

We are not only building lower emission transportation solutions but also using renewable energy and sustainable manufacturing processes at our Sacramento, Calif. plant. An all-round environmentally friendly design, the new high-floor light rail vehicles have a direct correlation between the light-weight design, energy consumption and operating costs.



Offering Tailored Service

Efficiency counts – everywhere in the United States.

As an operator, you are completely focused on the business of service and transportation. You not only need easy-to-maintain vehicles, but an expert service partner.

Effective operations require maximum availability, which can only be ensured through service and maintenance, precisely tailored to your needs. Siemens customer service and maintenance programs will support all the operations and service plans your business requires. After all, putting great things in motion means having reliable vehicles available – at all times.

The S200

Facing the Future with Innovation

Features & Benefits that can Improve On-Time Performance & Reliability

Maintenance

The S200 has been designed with ease of maintenance as a prime factor intended to minimize turnaround times. Several service-proven features are included in the S200 standard design that will make maintenance, cleaning and repairs easier. Simplified truck and tire maintenance and 10-year truck overhauls reduce downtime.

Safety

The S200 design meets the latest crash energy management (CEM) requirements including front-end strength and a crumple zone for collision with large objects. CEM provides operators and passengers significant safety improvement. Large operator windshield and cab side windows increases outside viewing range, including visibility of nearby pedestrians and bicyclists.

Smart Technology

A remote diagnostic tool and rail remote service desk allows the end user remote access to view active and historic vehicle fault data. Data is sent in real time when traveling on the alignment, at station platforms or vehicle staging locations.

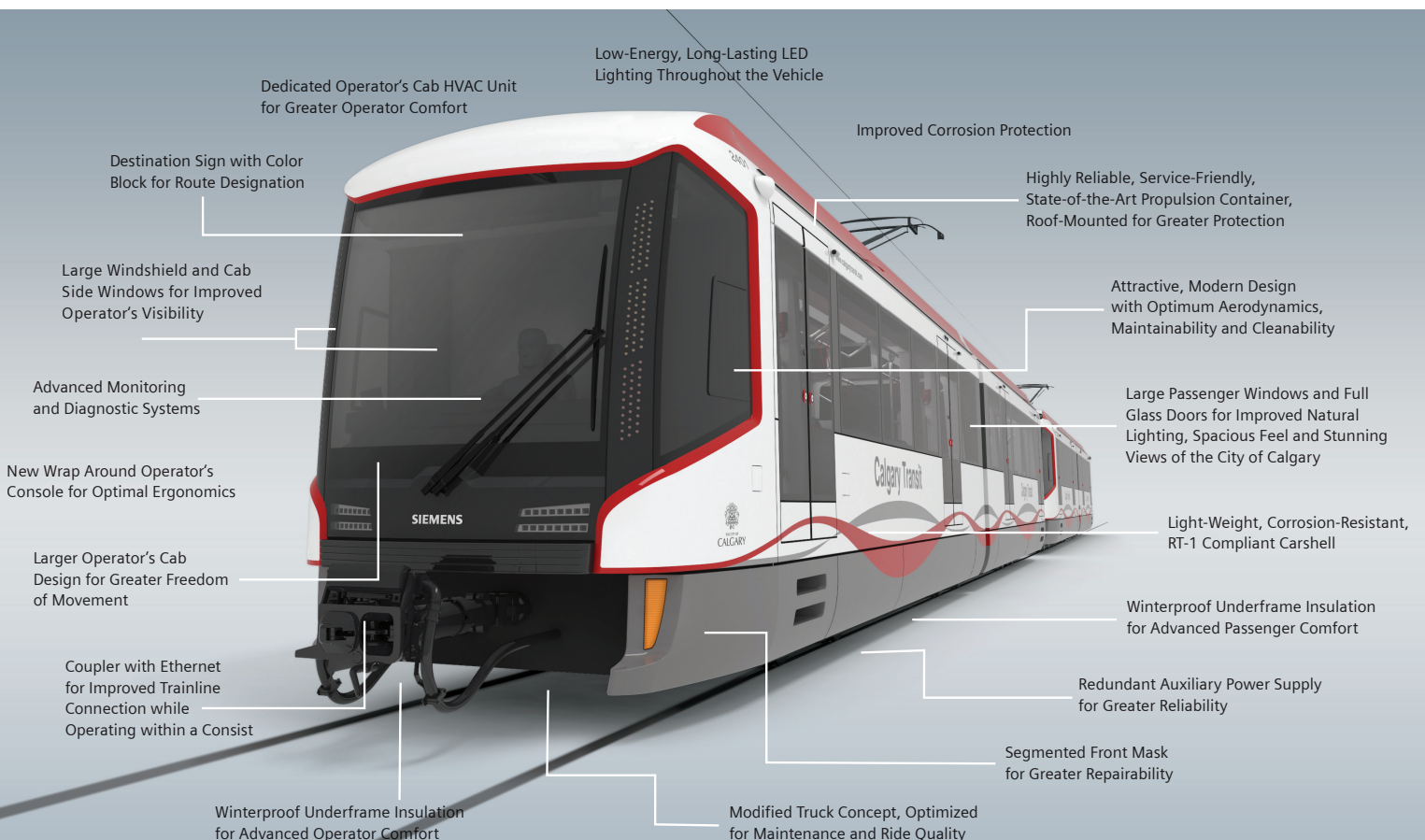
Enhancing the Riding Experience

The S200 is designed to present an attractive appearance that will blend with the modern cityscape. The Siemens design provides for a clean, spacious and well lit interior, contributing to passenger comfort. Features include large safety glass windows, improved longitudinal seating, and designed with Americans Disability Act (ADA) standards in mind.

While passengers are enjoying the smooth, comfortable and quiet ride, they will know their exact route position from the interactive GPS mapping display.

Passenger Security

Transit passengers and operators ride the rails with the peace of mind in knowing that help is just a click away, if needed. A fully integrated closed-circuit television system (CCTV) acts as the eyes and ears of the S200 vehicles, with high definition, weather resistant cameras keeping watch throughout each train and passenger communication systems at the ready.



A Long History of High-Floor Vehicles

Calgary, Alta.

Since beginning in 1981, Calgary has become the second busiest light rail system in the world, transporting an average of more than 300,000 riders daily safely and efficiently. In addition to expanding the city's fleet with over 60 S200 LRV's, the new trains will replace a portion of the fleet of current U2 Siemens vehicle provided to the city in the early 1980s, thereby continuing the strong customer relationship between the company and Calgary Transit.

Denver, Colo.

The success of Denver's initial order of 8 light rail vehicles and the increase in overall ridership over the years has prompted Denver to expand their system to include 59 miles of track and operate in excess of 170 Siemens light rail vehicles.



Edmonton, Alta.

Over the last 30 years the City of Edmonton has purchased over 90 Siemens light rail vehicles making them the oldest Siemens customer.

Los Angeles, Calif.

The Los Angeles County Metropolitan Transportation Authority (Metro) operates 4 light rail lines and 2 heavy rail lines. Metro purchased 52 Siemens high-floor light rail vehicles in 1998 to operate on the Green, Blue & Expo lines.

San Francisco, Calif.

Three unique designs were inspired by the city of San Francisco for the new Muni LRV4 contract for 175 new and improved light rail vehicles that will improve reliability, safety and customer communications. The contract is the largest light rail contract ever to be awarded in the U.S. with options for 85 additional vehicles.

St. Louis, Mo.

The greater St. Louis area of Missouri opened its light rail system with a base fleet of 31 Siemens vehicles in the summer of 1993. After 15 years, a second line opened to the public the summer of 2006. The St. Louis Metropolitan Area now consists of over 40 miles of track, 87 Siemens vehicles.

"We're looking for partners that we can collaborate with in terms of development, delivery, and operations. We want it to be the way the people want to travel, to get to areas of the city. We are very excited about our selection and we are looking forward to our continued relationship with all the teams within Siemens."

Russell Davies, Calgary Transit





Built Across North America by Siemens

In 1978, Edmonton, Alberta became the first North American city to open a light rail system with a base fleet of 37 U2 Siemens light rail vehicles (LRV). Thirty years later, a new generation of vehicle was born and the city of Edmonton expanded their network by 2.1 km and is currently operating 57 SD160 Next Generation light rail vehicles (LRV).





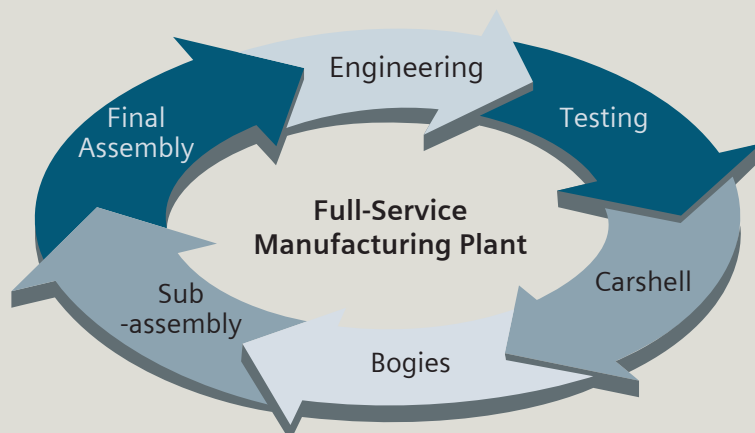
Manufacturing in North America

Moving cities forward with Light Rail Vehicles for more than 40 years.

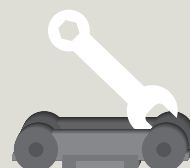
Siemens has expertise in the areas of urban, commuter and long distance transportation. The Sacramento full-service manufacturing plant builds rolling stock from start to finish optimizing project management and quality.

With an industry-leading U.S. supply chain and dependable delivery, Siemens offers environmentally friendly, efficient and reliable rail vehicles.

From pre-installation to ongoing maintenance, Siemens Customer Service goes the extra mile to extend and enhance the service life of all rail vehicles.



- **218 suppliers**
- **26 states**
for San Francisco Muni
- **175 suppliers**
- **28 states**
for Denver RTD



SERVICES
to Support
THE LIFE
of Your Vehicle

Published by
Siemens Mobility, Inc. 2020

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S200 High-Floor Light Rail Vehicle

Calgary, Alberta

Siemens delivered the first light rail vehicle (LRV) to the City of Calgary in the late 1970's. The initial success and increased ridership over the years has prompted the city to expand their system with the addition of new lines and the extensions to existing lines. Inspired by iconic images of the area and born from a focus on reliability and innovative technologies, Siemens created the S200 specifically for the City of Calgary.

A steel carbody construction, fully bi-directional, double articulated, low-floor vehicle, ideal for street-level operation and built in North America. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this S200 LRV has been designed to maximize passenger space, incorporating wide doorways and is equipped with transverse seating near the cab and longitudinal seating through the center of the car.

To provide operators a safe and comfortable work environment Siemens increased the cab size by 500 mm, allowing for larger cab side windows. The S200 features a wrap-around console for improved ergonomics and an operator's seat positioned on the

vehicle's centerline for increased visibility. A full-width glass partition provides over 300° of visibility for the operator and increased passenger safety.

Each LRV is equipped with eight glass paneled sliding plug doors, with four

Performance and Capacity

Maximum operational speed	80 km/h	50 mph
Maximum allowable speed	80 km/h	50 mph
Service acceleration	0.95 m/s ²	2.13 mph/s
Service deceleration	1.32 m/s ²	2.95 mph/s
Emergency braking rate	2.75 m/s ²	6.15 mph/s
Passenger capacity	60 seats Approx. 247 total passengers @ 6 p/m ² 2 wheelchair spaces 2 multi-purpose spaces	
Maximum operational gradient	7%	
Motor power rating	145 kW x 4	194 hp x 4
Catenary supply voltage	600 Vdc	

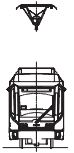
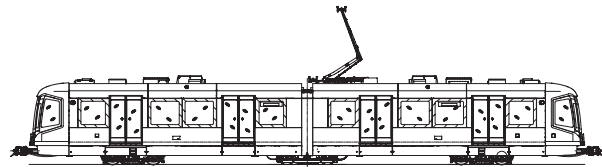
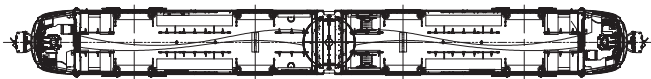
to each side of the vehicle. The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

The vehicle is also equipped with two designated wheelchair spaces and two multi-purpose spaces allowing for priority seating to disabled passengers, parents with strollers, or bicyclists.

To maximize passenger comfort each vehicle is also equipped with two roof-mounted HVAC units per LRV and independent HVACs for the operator's cab. And to combat the extreme winter conditions in Calgary this vehicle features heated flooring in the passenger area; triple-pane insulated windows and increased thermal insulation throughout the vehicle.

The S200 utilizes an advanced passenger information system consisting of operator and automated announcements, passenger-operator intercoms, exterior electronic destination signs; and a surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Calgary operates at speeds up to 80 km/h, carrying close to 250 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to five) as the maximum operational length. These light rail vehicles remove automobiles off the road in turn helping cities decrease their CO2 emissions.



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Siemens Mobility, Inc. 2019

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Vehicle Dimensions and Weight

Length over coupler	25800 mm	84.6 ft
Width	2654 mm	8.7 ft
Height with pantograph (locked down)	3850 mm	12.6 ft
Maximum pantograph height	7007 mm	up to 23 ft
Vehicle empty weight	40800 kg	89950 lbs (AW0)
High-floor section above TOR	982 mm	3.2 ft
Low-floor section above TOR	n/a	n/a
Minimum turning radius	25 m	82 ft
Vertical curve, crest	250 m	820 ft
Vertical curve, sag	350 m	1150 ft
Track gauge	1435 mm	4.7 ft
Wheel base (center truck)	1800 mm	5.9 ft
	1800 mm	5.9 ft



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SD160 High-Floor Light Rail Vehicle

Denver, Colorado

The Mile High City brought rail transit back to the region in 1994 when Denver opened its very own light rail system with a base fleet of eight Siemens vehicles. The success of that initial order and the increase in overall ridership over the years has prompted Denver to expand their system to include 59 miles of track and operate in excess of 170 Siemens light rail vehicles (LRV). Whether it's a ride to retail hot spots or perhaps a ride to the big game; Siemens LRVs are a fully-accessible friendly transportation for all.

A steel carbody construction, fully bi-directional, double articulated, low-floor vehicle, ideal for street-level operation and built in the North America. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this next generation SD160 LRV has been designed to maximize passenger space, incorporating wide doorways and a predominately knee-to-back seating arrangement.

Each LRV is equipped with eight wide opening sliding plug doors, with four to each side of the vehicle. The door spacing has been optimized to allow for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times. An added advantage of the Denver SD160 is the incorporation of step-wells at each doorway for street-level boarding.

The vehicle is also equipped with four designated wheelchair spaces allowing for priority seating to disabled passengers and doorway ramps to assist in the boarding and exiting of disabled passengers.

To maximize passenger comfort each vehicle is also equipped with two roof-mounted HVAC units per LRV.

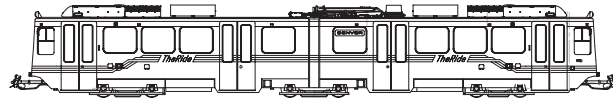
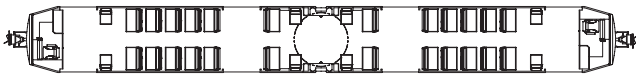
Performance and Capacity

Maximum operational speed	55 mph	88.5 km/h
Maximum allowable speed	65 mph	105 km/h
Service acceleration and deceleration	3.0 mph/s	1.34 m/s ²
Emergency braking rate	6.16 mph/s	2.75 m/s ²
Passenger capacity	56 seats Approx. 186 total passengers @ 6 p/m ² 4 ADA compliant wheel chair spaces	
Maximum operational gradient	6%	
Motor power rating	194 hp x 4	145 kW x 4
Catenary supply voltage	750 Vdc nominal	

And to combat the extreme winter conditions in Denver this vehicle features sidewall heaters in the passenger area; dual pane insulated windows and increased thermal insulation throughout the vehicle.

The SD160 utilizes a passenger information system consisting of operator and automated announcements, passenger-operator intercoms and interior and exterior electronic destination signs, as well as interior surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Denver operates at speeds up to 55 mph, carrying close to 165 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to four) as the maximum operational length. These light rail vehicles remove automobiles off the road in turn helping cities decrease their CO2 emissions.



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Denver 8 Vehicle Dimensions and Weight

Length over couplers	81.4 ft	24820 mm
Width	8.7 ft	2654 mm
Height with pantograph (locked down)	12.4 ft	3786 mm
Maximum pantograph height	up to 23 ft	7010 mm
Vehicle empty weight	93513 lbs (AW0)	42417 kg
High-floor section above TOR	3.2 ft	985 mm
Low-floor section above TOR	n/a	n/a
Minimum turning radius	82 ft	25 m
Vertical curve, crest	820 ft	250 m
Vertical curve, sag	1150 ft	350 m
Track gauge	4.7 ft	1435 mm
Wheel base	5.9 ft	1800 mm



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SD160 High-Floor Light Rail Vehicle

Edmonton, Alberta

In 1978, Edmonton, Alberta became the first North American city to open a light rail system with a base fleet of 37 U2 Siemens light rail vehicles (LRV). Thirty years later, a new generation of vehicle was born and the city of Edmonton expanded their network by 2.1 km and purchased 57 SD160 Next Generation light rail vehicles (LRV).

A steel carbody construction, fully bi-directional, double articulated, low-floor vehicle, ideal for street-level operation and built in the in North America. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

The interior of this next generation SD160 LRV has been designed to maximize passenger space, incorporating wide doorways and a predominately knee-to-back seating arrangement.

Each LRV is equipped with eight wide opening sliding plug doors, with four to each side of the vehicle. The door spacing has been optimized to allow

for greater passenger flow entering and exiting the vehicle, which ultimately decreases the station dwell times.

The vehicle is also equipped with two designated wheelchair spaces allowing for priority seating to disabled passengers and doorway ramps to assist in the

boarding and exiting of disabled passengers.

To maximize passenger comfort each vehicle is also equipped with two roof-mounted HVAC units per LRV. And to combat the extreme winter conditions in Edmonton this vehicle

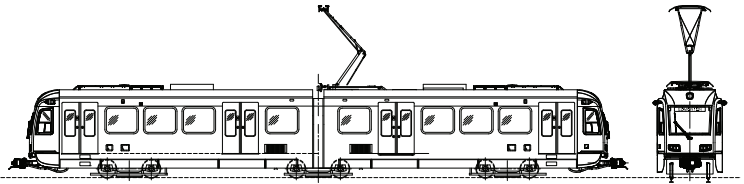
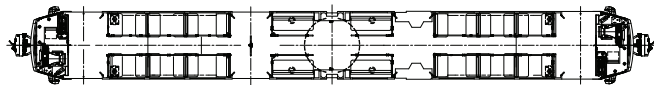
Performance and Capacity

Maximum operational speed	80 km/h	50 mph
Maximum allowable speed	80 km/h	50 mph
Service acceleration	1.07 m/s ²	2.37 mphps
Service deceleration	1.31 m/s ²	2.95 mphps
Emergency braking rate	2.63 m/s ²	5.9 mphps
Passenger capacity	60 seats Approx. 190 total passengers @ 6 p/m ² 2 wheelchair spaces	
Maximum operational gradient	7%	
Motor power rating	145 kW x 4	194 hp x 4
Catenary supply voltage	600 Vdc	

features sidewall heaters in the passenger area; dual pane insulated windows and increased thermal insulation throughout the vehicle.

The SD160 utilizes a passenger information system consisting of operator and automated announcements, passenger-operator intercoms and interior and exterior electronic destination signs, as well as interior surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for Edmonton operates at speeds up to 80 km/h, carrying close to 200 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to five) as the maximum operational length. These light rail vehicles remove automobiles off the road in turn helping cities decrease their CO2 emissions.



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Vehicle Dimensions and Weight

Length over coupler	24820 mm	81.4 ft
Width	2654 mm	8.7 ft
Height with pantograph (locked down)	3840 mm	12.6 ft
Maximum pantograph height	7010 mm	up to 23 ft
Vehicle empty weight	41500 kg	91500 lbs (AW0)
High-floor section above TOR	985 mm	3.2 ft
Low-floor section above TOR	n/a	n/a
Minimum turning radius	25 m	82 ft
Vertical curve, crest	250 m	820 ft
Vertical curve, sag	350 m	1150 ft
Track gauge	1435 mm	4.7 ft
Wheel base	1800 mm	5.9 ft



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Muni LRV4 High-Floor Light Rail Vehicle

San Francisco, California

Connecting San Francisco's unique neighborhoods, Siemens' latest technology in high-floor vehicles make travel easy, reliable and accessible. With the capability to accommodate high and low boarding and operate in multiple vehicle consists, the Muni LRV4 is there to help connect the great places throughout San Francisco. This vehicle is a hybrid creation, combining the best elements from both of our successful high-floor and low-floor light rail platforms – which have over 1,300 units currently in operation performing at high reliability. With an environmentally-friendly focus, the vehicles have utilized a strong lightweight design to ensure low energy consumption and minimum operating costs.

A steel carbody construction, fully bi-directional, double articulated, low-floor vehicle, ideal for street-level operation and built in North America. Each six-axle light rail vehicle is equipped with two power trucks (one under each end) and a non-powered center truck.

To provide operators a safe and comfortable work environment the

operators cab features large side windows. The Muni LRV4 features a wrap-around console for improved ergonomics and an operator's seat positioned on the vehicle's centerline for increased visibility. A full-width polycarbonate transparent cab provides

over 300° of visibility for the operator and enhanced safety and protection for the pedestrians and cyclists.

This vehicle is especially energy-efficient. The light-weight drive system recuperates braking energy, and the electro dynamic

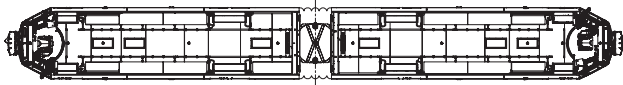
Performance and Capacity

Maximum operational speed	50 mph	80.5 km/h
Maximum allowable speed	55 mph	88.5 km/h
Service acceleration	3.0 mph/s	1.34 m/s ²
Service deceleration	3.5 mph/s	1.56 m/s ²
Emergency braking rate	5.0 mph/s	2.24 m/s ²
Passenger capacity	60 seats Approx. 193 total passengers @ 6 p/m ² 4 wheelchair spaces	
Maximum operational gradient	10%	
Motor power rating	174 hp x 4	130 kW x 4
Catenary supply voltage	600 Vdc	

braking to zero-speed reduces brake pad usage and life cycle cost. The LED lighting system uses up to 40 percent less electricity than standard incandescent and fluorescent lighting. And the smart HVAC controls save energy and reduce operating costs.

The Muni LRV4 utilizes an advanced passenger information system consisting of operator and automated announcements, passenger-operator intercoms, electronic destination signs; and a surveillance system for increased passenger safety.

Each LRV is electrically powered from an overhead catenary system (OCS) and for San Francisco operates at speeds up to 50 mph, carrying close to 192 passengers in each vehicle with the ability to operate in multiple vehicle consists (up to four). These light rail vehicles remove automobiles off the road in turn helping cities decrease their CO2 emissions.



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Vehicle Dimensions and Weight

Length over coupler	75 ft	22860 mm
Width	104.32 in	2650 mm
Height with pantograph (locked down)	11 ft 6 in	3505 mm
Maximum pantograph height	up to 19 ft	5791 mm
Vehicle empty weight	76000 lbs (AWO)	34473 kg
Entrance height	34 in	864 mm
Minimum turning radius	42 ft 7 in	13 m
Vertical curve, crest	310 ft	94.5 m
Vertical curve, sag	460 ft	140.2 m
Track gauge	4.7 ft	1435 mm
Wheel base	6.2 ft (power trucks)	1900 mm (power trucks)
	6.2 ft (center truck)	1900 mm (center truck)