



R-net System



MULTI-MODULE
POWERCHAIR
CONTROL SYSTEM



PG DRIVES TECHNOLOGY



Simple Installation of Multi-Input Devices

The R-net System

R-net is a multi-module electronic system designed specifically to control the speed, direction and many other functions on medium to high specification powered wheelchairs. Although R-net is highly flexible and expandable, with connection of up to 15 modules being possible, it is extremely simple to install and use. A key feature is the ability of the system to provide a simple, 2 module solution at a competitive price, while also being easily expandable to address much more complex Rehab type requirements.

The basis of R-net's unique combination of flexibility and simplicity is the R-net communications protocol. This is a custom software communications protocol developed by PGDT specifically for powered wheelchair applications. The underlying hardware link utilizes the well established and proven CAN bus, the automotive industry standard.

Connect & Go



Future Proof

The R-net protocol takes into account many issues that affect wheelchair dealers and therapists, such as: ease of installation, servicing, programming and up-grading wheelchairs to account for progressive conditions. Throughout the whole development program of R-net, the philosophy has been one of 'Connect & Go', i.e. modules can just be connected and will function without the need for complex programming. No other currently available powered wheelchair system is as flexible, intelligent or as easy to set-up as R-net. In a similar vein, R-net was designed to be able to accommodate future modules that haven't even been thought of yet. The protocol allows new modules to be added to existing systems and to automatically teach the system about their capabilities and programming requirements, without the user having to do any programming. R-net is therefore 'Future-proof' - easy to upgrade as new modules become available.

Multiple Input & Output Devices

One of the key design objectives of R-net System was to allow simple installation and control of multiple Input Devices. For example, the ability to connect a standard type Joystick Module and a Specialty Control Device into the same system. There is no need for any complex programming, and the potentially complex issue of safe transfer of control between the Input Devices is made simple and easy. Through features such as "Select & Grab" - a programming feature that can be used to prevent users inadvertently selecting inappropriate Input Devices on the wheelchair - potential lock-out conditions can be avoided.

Apart from multiple Input Devices, R-net can control multiple Output Devices, For example, seating control modules and environmental control systems, as well as multiple drive-modifier devices, such as collision avoidance systems. This huge flexibility is made easy to use through R-net's "Connect & Go" and "Future-Proof" capabilities.



Profiles

R-net can be set-up to work with single or multiple profiles, thereby addressing all systems - from the simple to the sophisticated. Profiles are used to control the overall characteristics of a powered wheelchair, allowing the whole performance to be changed at just the touch of a button. A total of 8 profiles can be supported and each can be dedicated to be multiple or single mode operation. Modes that may be accessed within a profile include output module functions such as seating systems, environmental control and PC mouse control. The quantity and flexibility of R-net's profiles offers unmatched simplicity of control over all the drive characteristics and ancillary functions available on even the most complex of powered wheelchairs.

Joystick Module

- Stylish and ergonomic
- High-resolution graphics LCD
- Large and clear screen icons
- Easy to operate push-buttons
- On-Board Programming option
- Programmable languages
- Remote switch inputs



Intelligent Seating/Lighting Module

- 6 channels
- 12 programmable axes
- Display & actuator mapping for each axis
- Simultaneous actuator movements
- Programmable speeds in each direction
- 2 universal inhibit inputs
- StVZO lighting control
- Brake light



R-net System

- Modular powered wheelchair control system
- Expandable up to 15 modules
- CAN Bus communications
- Connect & Go/Future Proof
- Multiple profiles
- Multiple Input & Output Devices
- Advanced diagnostics
- Friendly programming
- Simple servicing
- 3rd party module development kit

Power Module

- High power - 120A per channel
- Advanced and precise drive control
- 2 universal inhibit inputs
- Mirrors all system programming



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Superior Drive Control and More Power



PGDT has invested heavily in specialist drive test equipment, which allows detailed analysis of control system behavior and performance across all wheelchair operating conditions. For example, gradient control, curb climbing and high speed driving. This, coupled with the ever increasing speed and performance of microprocessors, means the R-net Power Module contains state-of-the-art drive control software, which provides new levels of responsiveness and user-comfort, without the need for complex and expensive motor types.

As well as the finesse of control, the R-net Power Module can supply an incredible 120A to each motor. This is in excess of 20% more than other Power Modules and will allow designers to produce faster and higher gradient rated powerchairs. The R-net Power Module contains two extremely versatile Inhibit Inputs. These can be programmed to provide infinite levels of speed reduction, full drive inhibits or prevention of movement of seat adjustment motors.

Joystick Module

The ergonomic requirements of the wheelchair user were essential elements in the development of the R-net Joystick Module. The use of a graphics LCD screen ensures a clear display in all light conditions. The size of the graphics on the screen can also be optimized to make them as large as possible to reflect the operating condition of the wheelchair. Any text displays are programmable, meaning the R-net System can be set-up to suit most local market requirements. The monochrome display was specifically chosen for clear visibility in direct sunlight, conditions where color LCDs or high-brightness LEDs become virtually invisible.



Furthermore, the positions of the display and the buttons, and the operating forces for the buttons, are chosen to make the Joystick Module as user-friendly as possible. The Joystick Modules are fitted as standard with two jack-sockets for external 'buddy' type buttons. There will also be optional versions of the Joystick Modules that contain rotary-type speed control potentiometers and/or toggle switches.

Seating Control

The standard R-net Intelligent Seating/lighting Module (ISM) provides unparalleled functionality and control. Up to 12 independent axes of motion, using single or multiple actuators, may be defined for each system. The actuators used and the display indication for each axis are programmable. A total of 6 seat adjustment actuators can be driven, at independently programmable speeds and with interlocking signals - for instance, preventing further recline if the seat is already tilted beyond a certain point. End-stop detection is optional between limit switches or current detection, the levels of which are programmable. The ISM contains two Inhibit Inputs, which can be programmed in an identical way to those on the Power Module.



Expansion of the R-Net System

The R-net system is uniquely powerful and easily expandable. The modules presented here are only the first few of many. PGDT plans to swiftly enhance the system with modules that provide universal specialty control functions, attendant control and further improvements in drive performance. In addition, PGDT is working with third-party specialist companies designing other modules that will be R-net compatible. These may include environmental control, PC mouse controls or collision avoidance systems. By licensing the R-net protocol and providing developer kits, PGDT is opening up the possibility of broadening R-net's capabilities much more swiftly than PGDT could do by itself. It also allows OEMs to create competitive differentiation of their vehicles by commissioning custom modules from 3rd party designers that are compatible with the safe foundation of an R-net drive system. To keep updated on the full suite of available R-net Modules, visit the R-net pages on the PGDT website. If you are a designer of these types of products and you would like to produce R-net compatible modules, please contact the US or UK based Applications Support Teams at PGDT.



Lighting Control

Lighting and turn signal indicators are mandatory for most European markets and the safety requirements, which are based on the automotive industry, are tough to meet. Nevertheless, the ISM complies with all relevant standards and includes features such as 12V control of lamps and turn signal fault detection, as well as offering a unique brake light function.

Programming

Programming is an essential part of the provision of a powered wheelchair. It is understood that programming needs to be simple for the mainstream requirements, but also extremely flexible for the more specialist types of applications. The R-net system can therefore be programmed in two ways.

Firstly, On-Board Programming (OBP), which uses the graphics LCD on the R-net Joystick Module to provide a clear display of multiple profiles, and allows for easy navigation and adjustment of the screens, using intuitive combinations of joystick movements and button presses. Access to OBP can be made secure via a key-code or a hardware key.

Secondly, and necessary only for advanced installation and set-up, there is a PC Programming Tool. This is a Windows-based software package, which presents the many programmable options of the R-net in a user-friendly and logical format, thereby allowing very complex set-ups and adjustments to be achieved relatively easily.

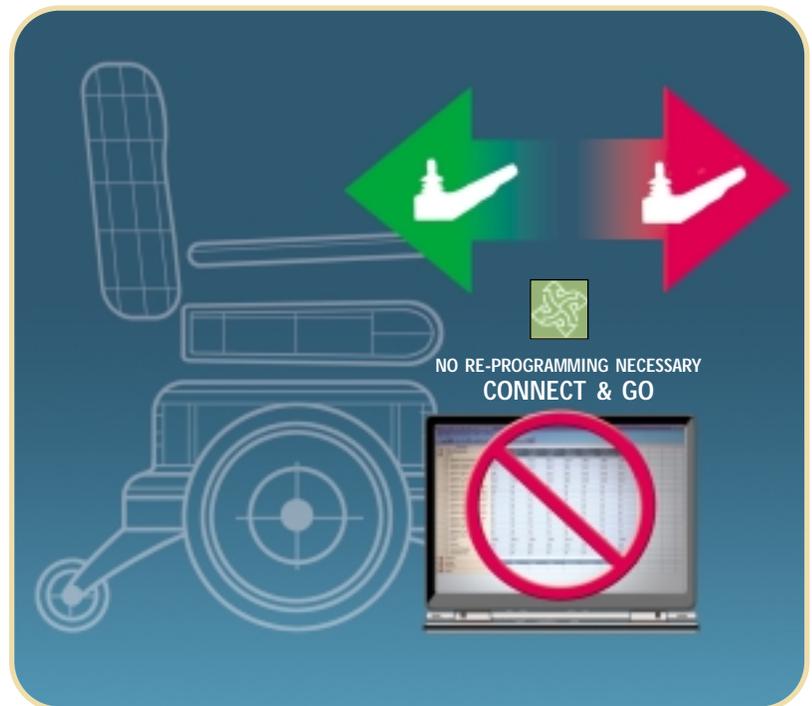
Diagnostics and Servicing

With the requirements of the powered wheelchair provider in mind, the diagnostics process was again a major design consideration. The Joystick Module's LCD can provide simple, yet informative, diagnostics messages, which the user can interpret. These messages can be programmable to different languages. More advanced information for service personnel is available through the Joystick Module's OBP screens or via a PC Programmer. The PC Programmer provides a particularly useful live-diagnostics feature, whereby the activation of a particular input, such as a joystick movement or button press, and the corresponding output can be monitored on the PC screen, to ensure correct operation.

One of the problems associated with diagnosing a multi-module system is establishing exactly which module may be defective. For this reason, each R-net Module contains an independent error log, which can be viewed via OBP or PC Programming.

R-net's 'Connect & Go' capabilities really help when it comes to service issues in the field. The programming of all R-net modules is mirrored within the R-net Power Module. This means that if any of the other modules within the system have to be replaced, this can be achieved by simply plugging in the replacement module. The R-net Power Module will transfer the appropriate settings to the replacement module automatically, completely eliminating the need to re-program the new module - simple, hassle-free and no mistakes.

PGDT also runs servicing schemes with powered wheelchair OEMs that will allow providers to replace certain components within Joystick Modules. This will, of course, result in quicker, easier and lower cost repairs. All PGDT produced R-net Modules will be eligible for the unique eWarranty scheme, in which PGDT directly swap-out defective modules to a provider. For more details on eWarranty, visit the Service Center at www.pgdt.com.



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PRODUCTS

SPECIFICATIONS

Power Modules

| | |
|------------------|------------------------------------|
| R-net PM60-1.2M | 60A max. current, 1.2 meter cable |
| R-net PM80-1.2M | 80A max. current, 1.2 meter cable |
| R-net PM120-1.2M | 120A max. current, 1.2 meter cable |

Joystick Modules

| | |
|--------------------|--|
| R-net JSM-sw | Joystick Module with jack sockets |
| R-net JSM-L-sw | Joystick Module with lighting control and jack sockets |
| R-net JSM-sw-P | Joystick Module with jack sockets and speed potentiometer |
| R-net JSM-L-sw-P | Joystick Module with lighting control, jack sockets and speed potentiometer |
| R-net JSM-sw-T | Joystick Module with jack sockets and toggle switches |
| R-net JSM-L-sw-T | Joystick Module with lighting control, jack sockets and toggle switches |
| R-net JSM-sw-P-T | Joystick Module with jack sockets, speed potentiometer and toggle switch |
| R-net JSM-L-sw-P-T | Joystick Module with lighting control, jack sockets, speed potentiometer and toggle switch |

Intelligent Seating/lighting Modules

| | |
|-------------|--|
| ISM-L-0.5M | Lighting Module with 0.5 meter cable |
| ISM-X-1.0M | Seating Module with 2, 4 or 6 seat channels and 1.0 meter cable |
| ISM-XL-1.0M | Seating/lighting Module with 2, 4 or 6 seat channels and 1.0 meter cable |

Connectors

| | |
|-------------|--------------------------------------|
| PG80-B | Battery connector kit |
| PG80-M | Motor connector kit (both channels) |
| PG-OBC | On-board charger connector kit |
| PG-Inhibit | Inhibit connector kit |
| PG-Actuator | Actuator connector kit (one channel) |

Programmers

| | |
|---------------|-----------------------------|
| OBP Dongle | Dealer access dongle |
| PC Prg Dealer | Dealer access PC Programmer |
| PC Prg OEM | OEM access PC Programmer |

General

| | |
|---|---|
| Supply Voltage | 24VDC |
| Over Voltage Trip | 35VDC |
| Under Voltage Trip | 14VDC |
| Reverse Battery Protection | 40VDC |
| Operating Temperature | -25°C to 50°C |
| Storage Temperature | -40V to 65°C |
| Moisture Resistance | IPx4 |
| Diagnostics | LCD information |
| Safety | Multiple hardware & software strategy Designed to ISO7176/14 |
| EMC on sample powerchair Susceptibility | Tested at 30V/m to EN12184 and ANSI/RESNA requirements To EN55022 Class B IEC801 part 2 |
| Emissions ESD | |

Power Modules

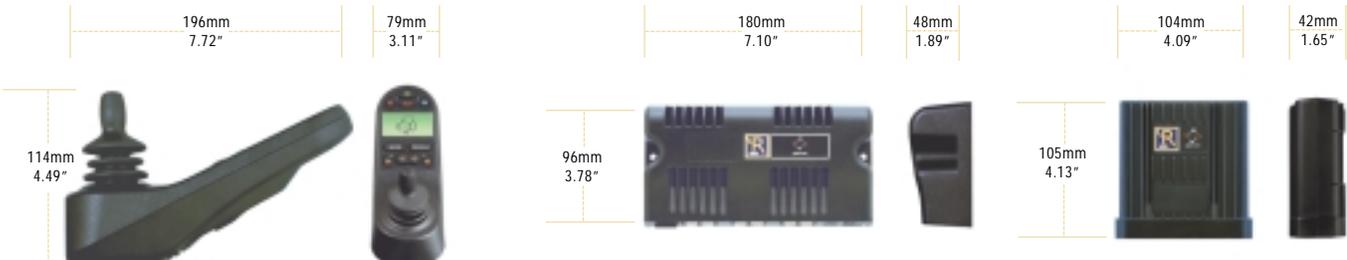
| | |
|---------------|------------------------|
| Drive Current | 60A, 80A and 120A |
| PWM Frequency | 20KHz ±1% |
| Brake Outputs | 12 or 24V, 0.1 to 1.0A |

Joystick Modules

| | |
|-------------------------|--------------------|
| TruCharge Battery Gauge | 10 steps, digital |
| Joystick Operations | >15 million cycles |
| Charging Current | 12Arms max. |
| Charger Connector | Use Neutrik NC3MX |

Intelligent Seating/lighting Modules

| | |
|--------------------|--|
| Lights Indicators | 21W total, 12V constant 42W per side, 12V constant, bulb fault detection |
| Standards | Meets StVZO requirements |
| Actuators | 2, 4 or 6 |
| Drive Current | 12A continuous at 24V |
| Endstop Detection | Programmable |
| Simultaneous Drive | Any combination |





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For further details refer to R-Net
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