New power wheelchair electronics
Comparison matrix

	Invacare MK 6i	**PG Drive Technology R-net**	**Quantum Q-Logic**
Power Wheelchair Bases supported	TDX series, FDX, Storm Series, Power Tiger, Some Pronto models	All Permobil bases Quickie Redman, other manufacturers	All Quantum Some Jazzy
Tracking technology	True Track: (GB Motors) G-Trac™ (Gyro Module) available on all MK6 systems . G-Trac can be enabled or disabled in any individual drive profile	Works with Permobil: ESP	Accu-Trac Technology
Electronics upgrades	Insert upgraded Pro (SD) Memory card into driver control – follow prompts. (Software upgrades available from web)	'Future Proofing' feature (new modules can be added without programming). Some modules are 'flash' upgradeable	Yes, software download by computer (Software upgrades available from web)
Initial system set-up	Factory settings. Programmer or SD card to modify for user needs. All modules added are recognized automatically – some (IR / Mouse) require initial programming	Plug and Play, modules recognized and programmed automatically	Plug and Play, modules recognized and programmed automatically
Programming			
Separate hand held programmer	Yes Help/Info key provides assistance. MK6 Hand Held Programmer (HHP) works on MK5 and MK6 systems. SD card available to back up or store commonly used programs.	Yes DTT – includes USB memory stick option for transferring files, mini-USB port for connection to PC.	Yes Programmer compatible with NE (non-expandable), NE+, and Q-Logic electronics. Help key to describe parameter functions. Favorites menu for storage of parameters used commonly.
HHP revision independent	Yes	Yes	No, upgrades available on web.
Program through display (manual buttons)	Yes, with SD card, can see all 4 drives at once on display	Yes	Limited
Program through joystick display	Yes, w/ SD card on all expandable systems – views one drive at a time.	Yes. On Board Programming Can see 4 Profiles at once	Limited
Consumer can program through access method	Yes, with Professional SD card IR programming w/ Pro or basic card IVC recommends only qualified individuals change programming settings on the power chair.	Yes Two access methods – keycode or 'dongle'. OEM sets which.	Limited- 24 hour time clock, language, trip odometer reset, reminders
Can program through computer	Yes, indirectly via Professional SD card	Yes PC Programming Tool	Yes PC Programming Station
Memory backup	Yes, onto Basic or Pro SD Card. (Non computer dependent) Card data can be read using USB card reader to view settings on PC.	Yes Through computer	Yes Through computer or handheld programmer. Programs can be shared between two with

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			SD card or through USB plug-in.
Can do "real time" programming	Yes on Non-expandable SPJ+ Joy. No on Expandable systems. (Programmer can remain plugged in, but turned off when driving)	Yes	Yes
Diagnostics	Time and Date stamped error codes available on programmer of color displays w/o use of programmer. Error Code Help Screens .(Def. & action required for remediation) Additional diagnostics for actuators and driver controls. Battery and connected device diagnostics viewable on color display screens	Each module has its own error log. Faults recorded sequentially for ease of use when diagnosing intermittent faults	Through computer and handheld: includes descriptions and error code help screens. Time and Date Stamp on fault codes.
Monitoring	Actuator Amp draw & Angle Position with Smart Actuators Status of limit switches.	Can monitor system voltage, currents, inhibits etc. with both PC and DTT	Through computer and handheld programmer: 100+ items available to monitor including seat position, actuator run time, multiple motor parameters, switch and button status
Number of Drives/Profiles	4 (plus one for Attendant Control)	8	5 (5 for each drive control device) Profile 1 is Drive Only, can eliminate any unneeded drives
Preset programs	Up to 13 available Standard driving programs, each can be modified, each can quickly be saved into any drive profile.	Single program of factory settings	Single program of factory settings for each device type. Additional programs available on web.
Simple vs. Advanced programming options	Can change Overall Speed and Response in each dive profile, or access all Programming adjustments	All levels of Programming accessibility are accommodated (Dealer/User/Therapist, Engineering/OEM and custom)	Quick-set up: can change overall Speed and Response on a scale of 1-5
Torque	Yes, programmable	Yes, programmable	Intuitive torque built-in (higher torque at lower speeds)
Sensitivity (how quickly the chair responds to joystick movement)	Tremor dampening settings as well as individual acceleration adjustments for forward, turning and reverse quadrants allow accommodation of user needs Traction parameter adjustment reduces speed when going into or coming out of a turn.	Tremor dampening Also separate Acceleration parameters for Forward, Reverse and Turn at minimum and maximum speeds in each profile	Turn Sensitivity parameter available to increase or decrease sensitivity. Speed turn rate parameter available to adjust sensitivity at higher speeds for steer correction. (all options per Drive) Tremor Suppression is global

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Initial travel (distance) of the joystick is ignored	No	Deadband, programmable	Center Deadband, programmable
No Drive Mode (allows Driver to enter a Mode or Drive in which the chair will not drive)	Sleep mode (all functions disabled) Also "No Driving mode, disables driving in selected drive w/ all other programmable functions available	Sleep Mode	Sleep Mode.
Program which drive to start in at Power On	Yes Program last drive used or a specific drive profile	Goes to last Profile used Power-up 'Mode' programmable on some JSMs	Yes Program to last drive used or profile #1
Display			
Color display	Yes, (Mini color Display)	Yes. Two contrast options – indoor or outdoor	Index Matching on displays to absorb ambient light for outdoor use, visor option available for enhanced display
Backlit display	Yes (Monochrome) Auto adjusts to ambient light	Yes	Yes, programmable dimming time and backlight. Programmer also has programmable backlight.
Languages supported	English	All text is programmable meaning all 'European' languages can be supported	English, German, Spanish, Italian, French
Customize text wording	Yes, with MK6i Programmer or Professional SD Card	Yes, through computer	Yes, through computer
Change font size	Enhanced View Mode enlarges Icons on Monochrome display. Enhanced & Sequential Scanning Modes with enlarged icons	Programmable option of large 'momentary' screens when changing speed or profile. Highlighted "User Menu" items are enlarged	No
Icons/Graphics	Yes, some combined with text	Yes, some with programmable text, e.g. mode names. Custom Icons are available to OEM's	Many, not designed to replace text
Display required for alternative access method	No, can add to any system w/ expandable Joystick or display.	No, can use Input/Output Module (IOM) instead	Yes. Display and Alternative Inputs combined.
Buttons on Display	Monochrome: Info (help), Save, Select, Directional arrows. Color: Power, Mode, Drive Select	Profiles, Mode, Power, Speed Up, Speed Down, Horn	Power

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	Invacare **MK 6i**	**PG Drive Technology** **R-net**	**Quantum** **Q-Logic**
Switch Jacks on Display	Two: 1 = Remote power on/off, 2 = mode port with up to 2 available functions using splitter or stereo switch	Two: Power and Profile / Mode	Two: 1 = Remote power on/off, 2 = mode port Mode- simple and advanced programming *Simple: cycles through modes* *Advanced:* *short command cycles through Drive Profiles* *long command toggles between Drive Profiles and Aux. & Seat functions* Power- Smart switch feature If enabled, long switch command turns system off, short switch command turns on and each subsequent short command cycles through Profiles.
Access to functions: consumer level of control	IVC recommends only qualified individuals change programming settings on the power chair. Consumer can add new IR devices by IVC Basic SD Card. Consumer can add new IR devices w/ Basic SD Card – and change date & time.	Consumer cannot program unless they have access to OBP Can disable speed buttons on joystick or display through programming Consumer has access to user menu to change clock time/settings, trip odometer, backlight color & display	Consumer can only change clock, trip odometer, profiles and speed. These can be restricted, as well.
Shortcut Menu on Display	No	Mode Selection in Standby. Any Mode or Profile can be entered via the joystick from Standby	Can program a "Quick Access List" of desired shortcuts that are shown when chair goes into auxiliary menu.
Locking feature to prevent any external access to chair	No	Yes: Either button sequence or key or both or neither – fully programmable	System Lock - can be turned on or off
Other	User can view battery voltage and date / time stamped error codes to report to RTS prior to service calls	Clock, speed display on color version Mode name and profile name text programmable	Can download digital photos to display or hand control Clock, MPH, Battery %, Trip Odometer, Odometer
Joystick: hand rest	Multiple Joystick Styles PSF style provides hand platform	No	Yes, through custom department.
Joystick: display	Yes, color MPJ or monochrome (PSF – PSR)	Yes, monochrome or color	Yes, color, index matching
Joystick: buttons or toggle switches	Various options including buttons, toggle and dials on some joysticks	Buttons, Toggles and / or speed pot optional	Buttons, side mounted dial (speed) and toggle (on/off, profile)

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	Invacare MK 6i	**PG Drive Technology R-net**	**Quantum Q-Logic**
Joystick: switch jacks	Two: 1 = Remote power on/off 2 = Stereo (two choice) switch port. (Can be programmed for Mode select, Drive Select, or Single actuator operation, (up, down, and up/down). May program two actuator functions to allow toggle switch function of actuator	2: power and profile / mode	Two: 1 = Remote power on/off, 2 = mode port Mode- simple and advanced programming *Simple: cycles through modes* *Advanced:* *short command cycles through Drive Profiles* *long command toggles between Drive Profiles and Aux. & Seat functions*
Joystick: speed dial	Yes, option	Yes, option	Yes- can be programmed for: *Limited:* high and low limits *Continuous:* no limits *Continuous forward:* only forward movement of dial is required to change speed, will cycle through *Continuous rearward:* only reverse movement of dial is required to change speed, will cycle through
Joystick: shortcut buttons	No	Profile button can be reassigned to provide access to both profiles and modes	2 – 1 for profile 1 and 1 for seat profile- Labeled I and II Menu button displays Menu of shortcuts on display for user programming.
Joystick: Can program the same joystick to be proportional or switched	No-Except if using latched driving. (latched mode with joystick operates in digital or switch mode)	No (Step latched drive operates in digital manner)	Yes, if joystick is deflected more than 50% will act as switched joystick when programmed
Joystick: can use with only 3 directions	Yes, activate RIM Mode Enter "Reversing" mode either w/ mode switch or through "Standby Select"	Training Mode allows one or more drive directions to be inhibited	Yes, 3-Direction Profile, using Left, Right and Reverse Forward/Reverse toggle accomplished by quick movement in Reverse Double hit to left to access actuators
Joystick: compact/remote joystick	Yes, no buttons (Several additional ASL compact remote choices as well)	Yes, Compact Joystick & Compact Joystick Lite (via Omni or IOM) with optional ability switch attachments	Stand Alone joystick Power and Mode buttons 3 Drive & Actuator Functions

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	Invacare MK 6i	**PG Drive Technology R-net**	**Quantum Q-Logic**
Component required for alternative access connection	-Digital Interface for Sip n Puff & digital driver controls. -Interface for ASL digital systems. -No Interface required for Alternative Proportional Controls.	Omni Display (2 9 pin ports) or IOM (9 pin port)	Enhanced Display (9 pin) and Sip and Puff Interface
Number of alt. input devices that can be connected	Up to 4 Driver Controls plus attendant control.	2 (on each Omni) 1 (IOM) System can support up to 14 Omnis with 2 access methods each	Up to 4 driver controls- 1 Joystick, 1 Stand Alone, 1 Attendant Control, and 1 Specialty Control
Transfer of control between alternative input devices	Choose Drive Profile with desired driver control selected/assigned	Choose Profile programmed with that access method	Turn on the input device using power button for that device (i.e. on display)
Head Array	Access to Reverse options: 2 options: 1. Mode switch: 1st activation enables Reverse. 2nd activation returns to forward driving. 2. Bypass mode switch by programming "Standby Select". Once in Standby, left driver command activates Reverse driving. Forward command activates Forward driving.	Access to Reverse options: *Mode switch:* single operation toggles direction Or *Rear Pad:* first activation toggles direction, second activation drives 'Switch Medium' time for easy access to user menu 2 axis option for seating actuator control	Access to Reverse options: *Mode switch:* 1st activation chooses Reverse, second activation can be either mode or standby select Or *Rear Pad:* first activation toggles direction, second activation drives
Sip 'n puff	4 pressure Digital Interface Pressure programmable in all 4 quadrants to match user's abilities	4 pressure Built into Omni display Programmable 'ramp up', 'ramp down' time	2 or 4 pressure option Separate module required Can adjust Sampling Delay to allow consumer to "ramp up" to command
Switch Access	Supports single, 3, 4 and 5 switch access Can do 2 switch access using ASL 2 switch fiberoptic array	Supports single, 3, 4 and 5 switch access Can do 2 switch access using ASL 2 switch fiberoptic array	Supports single, 2, 3, 4 and 5 switch access <u>2 switch:</u> 1st switch – double click and hold is Forward, single activation is Left. Double click and release is Mode. 2nd switch – double click and hold is Reverse, single activation is Right Can also do 2 switch access using ASL 2 switch fiberoptic array <u>3 switch:</u> Double hit on left to access actuators

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	Invacare MK 6i	**PG Drive Technology R-net**	**Quantum Q-Logic**
Single switch scanning	Requires external scanner	4 directions on display Can scan all chair functions	4 or 8 direction, on display Can scan Mode option
Power button/toggle on joystick	Yes	Yes	Yes, push toggle forward for on or rearward for off, each subsequent push forward goes through profiles
Power switch jack on joystick	Yes	Yes	Yes
Mode button/toggle on joystick	Yes	Yes	Yes (same toggle as power)
Mode switch jack on joystick	Yes, (Stereo). Can add splitter for 2 functions. Program for Mode & Emergency, Stop, Drive Select, Single Actuator Operation. (May also use stereo switch).	Yes, can also access profiles Used as emergency stop in latched drive or switch to standby option	Yes, simple and advanced programming *Simple: cycles through modes* *Advanced:* *short command cycles through Drive Profiles* *long command toggles between Drive Profiles and Aux. & Seat functions*
Mode switch sequence: joystick	Reverse, Automatic Positioning, Powered Seating Actuators, Drive Select, IR, Mouse, ECU 1/2, 3/4	Profiles, Actuators, Aux., Drive. Sequence programmable	Drive, Actuators, Aux. Profile 1 always Drive, Profiles 2-5 individually programmable for Drive, Seat, Aux. or disabled
Standby option: joystick	Standby Select: (programmable time) allows driver control to select next operating mode after chair enters Stand By using directional command (Driving, Actuators, ECU, Mouse, IR, Drive Select). Standby can be disabled in ECU and Mouse mode.	Yes, adjustable time or via mode jack socket switch Can enter all modes and profiles from Standby, programmable direction commands	Standby Select: go to Menu of Profiles Can individually enable for drive, seat, aux. (global) Scroll time programmable
Sleep Mode: joystick	Sleep: programmable time Mode switch required to awaken	Yes, programmable	Yes, programmable
Shortcut buttons: joystick	No	Profile button can be reassigned to provide access to both profiles and modes	3 buttons- profile 1, seat profile, and menu.
Separate switch for actuators: with joystick	Yes	Yes, via ICS Alternative Switch Box. Attach up to 8 custom programmable ability switches.	Yes
Power (Alt. Access)	Switch port for remote on/off Toggle on display	Switch jack on Omni Display Switch jack on IOM	Switch jack on Display, Combined mode and power options available through Smart Switch (1st activation Power On, subsequent activations Mode, long hit Power Off)

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	Invacare MK 6i	PG Drive Technology R-net	Quantum Q-Logic
Mode (Alt. Access)	Switch jack on Joystick and Display, mode button on Joystick and Display	Switch jack on Omni Display	Switch jack on Display, Combined mode and power options available through Smart Switch
Mode switch functioning (Alt. Access)	Mode switch activation enters next available activated function (Reverse, Aux, Powered seating, etc.), and also acts as an emergency stop switch.	Mode switch activation takes consumer to Driver's Menu on display or can activate sequence	Mode switch activation sequence: Reverse, Profiles, Power. Can be programmed in multiple different ways.
Standby option (Alt. Access)	Standby Select Mode occurs after a programmable time elapses. Directional driver control command chooses function / active mode. Standby in ECU and Mouse Mode can be disabled.	Yes, adjustable time or switch to standby via mode jack plug Directional command chooses function.	Standby Select takes consumer to list on display after a programmable time elapses. Can be enabled for drive, seat, aux. individually. Directional command chooses next function.
Display function navigation: manual (Alt. Access)	Manual scroll: directional switches move through displayed choices Driver Control: right command can scroll through drives 1-4, mode switch selects available modes in each drive. Driver Control operates highlighted Mode. Drive Control Navigation (no switches) programmable.	Manual scroll: Forward command moves up displayed list, Reverse moves down, Right selects, Left moves back a level. Order of menu programmable.	Manual scroll: Forward command moves up displayed list, Reverse moves down, Right selects, Left moves back a level Holding down the Forward or Reverse command will continue to scan after a programmed amount of time
Display function navigation: scanning (Alt. Access)	3 scanning types - any drive command makes selection: Modified row column, enhanced (version of row/column w/large icons), sequential (one mode in each drive at a time). All with adjustable speed, adjustable initiation time.	Auto scroll: adjustable speed. Right selects and Left moves back a level.	Auto scroll: adjustable speed. Right selects and Left moves back a level.
Display function navigation: auditory scanning (speech) (Alt. Access)	No Auditory feedback available for screen/mode changes whether through manual operation or in scanning modes. Different beeps used for different modes. Allows Display to be non-visual dependent. (Can mount on back of chair).	No Auditory feedback to indicate Profile, operating Mode or selection on User Menu	No Different tones for each drive profile, seat, and auxiliary. Auditory feedback available for screen/mode changes whether through manual operation or in scanning modes
IR signal output	IR Module pending release, 6 devices (1 X10) Can interface external EADL with IR capabilities through Aux. modules	Yes, standard on Omni Can also interface external EADL or send IR through a computer accessed through the wheelchair.	Yes Back of Display, multidirectional
Preset codes	Yes	Yes	No
Learning	Yes	Yes	Up to 288 (depending on size of code), macros (up to 3 commands)
Macros	No		Yes

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X-10 control Insteon control	IR Module w/ X-10 capabilities 8 devices Can interface external EADL or send IR through a computer accessed through the wheelchair.	Yes, through IR/X10 converter or IR/Insteon converter Can interface external EADL or send IR through a computer accessed through the wheelchair.	Yes, through IR/X10 converter or IR/Insteon converter. Requires IR remote for programming (not included) and modules (not included) Can interface external EADL or send IR through a computer accessed through the wheelchair.
Telephone	IR Module can access IR phone Can interface external switch operated phone or send IR through a computer accessed through the wheelchair.	IR receiving phone (not included) Can interface external switch operated phone or send IR through a computer accessed through the wheelchair.	Yes IR phone (not included) Can interface external switch operated phone or send IR through a computer accessed through the wheelchair.
Mouse emulation	-Yes, separate from display -Can retrofit -Radio Frequency (RF) -Proportional with joystick 3 or 4 quadrant operation 3 quadrant Operation: Rt command = L/R, Fwd command = Up/Down, L command = mouse L click, /double click/drag. R command can be R click $995 (mouse and IR pkg) $795 Mouse Only	Yes, separate from display, optional Blue Tooth Mouse Module Proportional with joystick $300	Yes, built into display Blue Tooth or IR IR requires ASL or GEWA mouse receiver Proportional with joystick Harness to power module with 1-2 switch jacks
Mouse emulation Clicks	2 switch jacks on mouse module for left and right clicks Or Use dwell software Or Use 3 quadrant mode Left command = left click Reverse command = right click Forward	Joystick: can use Speed up and Speed down buttons for L/R clicks in Mouse Mode Joystick or Alt. Access: any quick hit of a directional command can be programmed to L or R click or Scroll up or down or Use dwell software	Left directional switch: click, double hit=double click Right directional switch: right click or one switch: toggles between mouse movement and mouse click. Mouse click screen: 4 directions for L click, R click, double click and drag or Use dwell software

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Auxiliary function templates	N/A	No	Yes, can customize
Component required for interfacing	Aux1/2 or Aux3/4 (can use both) Aux1/2 = 2 outputs, 4 switch closures each Aux3/4 = 2 outputs, 5 switch closures each	IOM: Input/Output Module	ECU Module, 8 switch outputs
Attendant Control	Proportional or Digital		
Attendant control features	Power w/c control, does not use up a drive profile Programmable Performance Adjustments for both Proportional & Digital Att Controls If attendant control is on, Driver access method will not operate.	Uses Profile 8 as standard Can be programmed to any profile(s) Programmable 'grab' option to allow either the caregiver or the user to regain control. Can access all user modes or programmable to specific modes	Power mode button Doesn't use up a profile If attendant control is on, access method will not operate. Profiles individually programmable. Profiles 2-3 can be turned off

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Actuators			
General comments	Smart actuator: can execute Automatic Positioning (from only 1 or up to 6 steps each sequence), up to 4 pre-set positions (1 per Drive). Automatic Positioning with tilt, recline, and center mount legs. Actuator Speeds programmable. Drive lock out programmable on / off	Up to 12 axes of seat motion can be defined using up to 6 actuators, either singly or in multiple combinations. Inhibits can be used to slow or stop chair or any actuator motion depending on position of an actuator. Programmable actuator speed Permobil: ICS Intelligent Control System (not R-net).	Up to 12 axes of seat motion can be defined using up to 6 actuators, either singly or in multiple combinations. Inhibits can be used to slow or stop chair or any actuator motion depending on position of an actuator. Programmable actuator speed, start and stop angles Joystick control allows proportional speed control.
Pressure Relief Signal	Series of beeps and a visual prompt to perform pressure relief. Chair will not drive until the mode switch is activated, (user acknowledges beeps). Frequency (time) is programmable up to 60 minutes.		Can program individualized reminder for pressure relief. Can program for set time or as an interval. Will repeat to programmable frequency until confirmed. Optional audible alert.
Other			
Other comments	Memory card works on Expandable level electronics only (4 Drive Systems). Can store/archive multiple systems or individual drives in a library for downloading to other systems. MK6 Laptop IVS can view / change / print programmed settings	3rd party additional modules available from HMC, others pending	User Reminder feature-programmable time or interval with customized wording programmed in PC programmer. Maintenance Reminder feature-programmed by days or miles. Can be individualized with PC programmer to input company name / number or other text.