Benshaw RX4E Softstarters

Introduction

Modern industrial motors often require a gentler touch during startup and shutdown to avoid damage and downtime. Soft starters are electronic devices that ramp up motor voltage gradually, limiting inrush current and mechanical shock [1]. Unlike across-the-line starters that can subject motors and equipment to sudden stress, soft starters ensure a **controlled ramp-up of power**, resulting in a smoother start and stop for heavy machinery [1]. This controlled startup extends the lifespan of motors and driven equipment by reducing the electrical surges and torque spikes typically seen in direct-on-line (DOL) starts [2]. In fact, soft starters can cut peak start current to roughly 2–3 times the rated current (versus 6–8× in DOL starts), dramatically easing mechanical strain [3] [4]. Benshaw's RX4E Series Softstarters are a prime example of this technology, offering an advanced solution for reliable motor control. The **Benshaw RX4E** is a packaged low-voltage soft starter assembly designed to deliver smooth motor starting with robust protection features and an emphasis on maximum uptime. It provides solid-state reduced-voltage starting for normal operation and a full-voltage bypass mode for emergencies "at the flip of a switch," thanks to a unique dual-redundant design integrating both soft starter and direct starter in one unit [5]. In the sections below, we will explore the RX4E's technical specifications, features, and how it helps solve common motor starting challenges.

Technical Overview and Specifications

The Benshaw RX4E Series is an **enclosed combination soft starter** system built for heavy-duty motor applications. Each RX4E unit comes housed in a rugged NEMA 12 enclosure (rated for indoor industrial environments; NEMA 3R outdoor versions are also available) and includes all necessary power and control components pre-wired for quick installation. The series covers a broad range of motor sizes, with standard models supporting up to **600 HP at 480 V** three-phase (heavy-duty rating) in the stock lineup [6] [7]. Units are available as small as around 50–75 HP at 480 V on the lower end, scaling through 100, 150, 250 HP and so on, up to the 600 HP top end, making the RX4E suitable for a wide spectrum of motor horsepower requirements [8] [9]. All models are **UL listed** and built to comply with IEC/UL 60947-4-2 standards for motor controllers, ensuring safety and reliability. Heavy-duty performance is a key design criteria – the RX4E soft starter is rated to handle **450% of motor full-load current (FLC) for up to 30 seconds** during startup, which accommodates high inertia loads and frequent starts without overheating [10]. Moreover, the assembly carries a **125% continuous current rating** (1.15 service factor), meaning it can tolerate moderate overloads continuously – a testament to the robust build of the power electronics and bypass contactor [11]. Each unit also boasts a high short-circuit fault withstand rating when equipped with the appropriate circuit breaker. **Standard RX4E packages offer up to 65 kAIC fault interrupting capacity** using an integral molded-case circuit breaker with a through-door flange handle [12]. This high fault rating is critical in industrial settings with powerful supply systems, as it allows the starter to be safely applied on circuits with up to 65,000 A of available fault current without additional upstream protection. Benshaw backs the RX4E series with an **exclusive three-year warranty**, reflecting confidence in the product's longevity and reinforcing its positioning as a heavy-duty, mission-critical motor starter solution [7].

Figure 1: A Benshaw RX4E Series soft starter (75 HP model) in a NEMA-12 enclosure. The door-mounted operator interface includes a keypad (top) for the EMX4i controller, start/stop pushbuttons (green/red), a white local/remote selector switch, indication lights (running and fault), and an external handle on the right for the built-in circuit breaker disconnect. This packaged design simplifies installation and provides safety and control at the panel.

Internally, the RX4E combines several subsystems into one cohesive package. The heart of the system is Benshaw's **EMX4i solid-state soft starter** module, a microcontroller-driven thyristor (SCR) unit that controls the voltage applied to the motor during starting and stopping. This soft starter is mounted alongside a **fully rated bypass contactor** and a **motor circuit breaker**, which together enable the dual operating modes (soft start or across-the-line) and provide protection. For normal operation, the SCR module handles the reduced-voltage start, then the heavy-duty bypass contactor closes to carry the motor's full running current with only 0.1% voltage drop (ensuring efficiency around 99% during run) [13]. In an emergency or if the soft starter must be taken out of service, a selector switch can put the unit into **Across-The-Line (ATL) bypass mode**, using the same contactor and breaker to start the motor at full voltage [5]. This dual-redundant design is especially valuable for critical processes where any downtime is costly – if the soft start functionality is unavailable, the motor can still be run at full power as a backup. The RX4E's bypass contactor is **mechanically and electrically interlocked** with the soft starter, and it's a full horsepower-rated contactor (running-duty rated) with a 1.15 service factor to match or exceed the motor's requirements [14]. A dedicated **electronic overload relay (Benshaw SPE series)** is included and wired in circuit for the bypass mode, providing thermal motor protection during full-voltage run. The package also contains a control power transformer (typically stepping down incoming line to 110–120 V for control circuits) with primary and secondary fuses, so that the soft starter and auxiliary devices have a stable control voltage supply [15]. On the enclosure door and terminal blocks, all operator controls and I/O are pre-wired: door-mounted start and stop pushbuttons, a **Local/Off/Remote selector**, indicator lights (Run status, Fault alarm), an **overload reset button**, and even a door-mounted **keypad/display unit** for the soft starter are provided as standard [16]. Additionally, internal terminal strips are provided for remote start/stop commands, and there are auxiliary contacts (Form C relays) for run status (4 sets) and a fault trip contact for interfacing with external systems [17]. Overall, the technical configuration of the RX4E is that of a **combination starter** – integrating breaker, contactor, and controller – engineered for heavy-duty

performance and ease of use. Table 1 below summarizes some key technical specifications of a typical Benshaw RX4E softstarter unit:

- **Line Voltage:** 480 V AC (three-phase, 50/60 Hz) standard; optional configurations for 208–240 V or 575 V systems available by special order.
- **Horsepower Range:** ~50 HP up to 600 HP at 460–480 V (heavy duty rating). Multiple models cover intermediate ratings (75, 100, 125, 150, 200, 250, 300, 400, 500, 600 HP) [8] [9].
- **Rated Current:** 65 A to 720 A (continuous) across the model range (corresponding to the HP ratings above). Soft start current up to 450% for 30 seconds (heavy duty). Continuous current 125% of FLA.
- **Enclosure:** NEMA Type 12 (indoor, dust-tight) standard on all models; optional NEMA 3R (outdoor weather-resistant) versions denoted by different suffix. Enclosures are steel, with dimensions increasing for larger HP units (e.g. up to 87″ H × 37″ W × 20″ D for 400–600 HP frames) [18].
- **Built-in Disconnect:** Molded Case Circuit Breaker (MCCB) with door-mounted flange handle. Available in standard interrupting or high-interrupting (65 kA) versions. Sized appropriately per motor HP (e.g. 225 A frame for 75–125 HP, 400 A frame for 200–250 HP, 600 A for 300 HP, 800 A for 400 HP, 1200 A for 500–600 HP) [19] [20].
- **Bypass Contactor:** Electrically and mechanically interlocked AC contactor, full motor HP rated. Engages after soft start to carry run current; also used for ATL mode. Rated “running duty” and for across-line starting duty with **Class 30** thermal overload characteristics on the separate overload relay [21].
- **Control Power:** Integral control transformer supplying 110 V AC control circuits from line power, with primary & secondary fuse protection [15]. Control circuit typically 120 V for contactor coils, relay coils, etc., and low-voltage logic for the EMX4i controller.
- **Operating Environment:** Ambient temperature typically -10°C to +40°C without derating (higher with derating or ventilation), relative humidity 5–95% non-condensing. Altitude up to 1000 m ASL without derate (standard).

This combination of features means the RX4E arrives as a **turnkey motor starting solution** – one that can be quickly installed and commissioned with minimal additional components needed. All the user must do is connect the line input, load (motor) output, and any desired control or communication wiring, and the system is ready to perform either soft starts or full-voltage starts on demand.

Key Features and Design Benefits

The Benshaw RX4E Softstarter series stands out through a blend of **robust hardware design and intelligent digital control**. Below are some of the key features and how they benefit end users:

- **Dual Redundant Starting Modes:** Each RX4E unit can function as a solid-state soft starter or as a direct-on-line starter with the flip of a selector switch. In normal operation, the **soft start mode** gently accelerates the motor, while the integrated **ATL bypass mode** serves as an emergency backup to keep the motor running at full voltage if needed [5]. This dual functionality greatly enhances uptime in mission-critical applications. For example, if the soft starter section must be taken offline for maintenance or in case of a component failure, the operator can switch to bypass and continue running the motor across-the-line, avoiding a process shutdown. Many industrial processes (conveyors, pumps, compressors, etc.) cannot tolerate extended downtime, so this redundancy is a significant advantage. The RX4E’s unique design has separate paths for solid-state and electro-mechanical starting, all contained in one enclosure – a feature that underscores Benshaw’s focus on

reliability for critical applications. (Notably, Benshaw also offers medium-voltage soft starters with similar dual redundant "backup start" capabilities for large motors, reinforcing the emphasis on keeping operations running under any circumstance.)

- **Heavy-Duty Rating and Thermal Capacity:** The RX4E is built to handle **high starting currents and frequent start/stop cycles**. Its 450% for 30 seconds current rating (and 600%+ for shorter durations) is suitable for heavy-duty starts such as loaded conveyors, crushers, or high-inertia fans. Users can confidently start hard-to-start loads without tripping the starter. The unit's thermal management – including the use of rugged SCRs with proper heatsinking and the automatic bypass after start – ensures that heat dissipation is minimized during run (the SCRs are bypassed, so they generate negligible heat once the motor is at full speed). The inclusion of a correctly sized overload relay (Class 30 on the bypass circuit) means even long acceleration ramp times or high inertia loads that take extended time to reach full speed can be accommodated safely before any motor overheating occurs. Overall, the **thermal capacity** of the RX4E supports demanding applications where standard light-duty soft starters might fall short. Furthermore, all RX4E soft starters come with **Benshaw's 3-year warranty**, which is notably longer than the 1-year industry standard warranty offered by many competitors – a reflection of the confidence in the heavy-duty design and build quality [22] .

- **Integrated Control and Protection:** Being a combination starter, the RX4E includes all necessary control and protection components. There is no need for external motor breakers or contactors, as these are built in. The door-mounted **MCCB disconnect** not only provides short-circuit protection and a means to isolate power, but with its flange handle and lock-out capability, it enhances operator safety during maintenance. The **run-duty bypass contactor** and **electronic overload relay** furnish complete motor running protection equivalent to a traditional starter. In soft start mode, the EMX4i controller itself also provides motor overload protection via electronic thermal modeling of the motor (adjustable class, default typically Class 10 or 20) [23] . Additionally, **built-in phase loss and phase imbalance detection** will trip the starter if any supply phase is lost or significantly unbalanced, preventing single-phasing damage [24] . **Under-voltage and over-voltage protection** guard the motor against harmful supply fluctuations, and an adjustable **excess start time** function stops the motor if it hasn't reached full speed within a set time (indicating a stalled load or excessive load) [25] . The RX4E also monitors for **ground fault currents** – with an optional core-balance CT, the EMX4i can detect ground leakage current and trip to protect the motor and system from insulation failures or wiring faults [26] . All these protections are *standard* and programmable, giving the user a comprehensive motor protection relay's functionality as part of the soft starter. The unit's protective features ensure that common fault conditions (overloads, stalled motor, phase faults, etc.) are handled promptly to avoid catastrophic damage, thus improving overall system safety and reducing repair costs.

- **Ease of Installation and Use:** The RX4E is designed to simplify both the installer's and the operator's experience. From an installation perspective, having the breaker, contactor, and controller in one pre-engineered package means fewer wiring runs and less panel space compared to assembling separate components. The enclosure arrives with all internal wiring neatly done and components like the control power transformer in place. Mounting the unit and connecting line/motor cables are the main tasks for setup. On the front panel, **door-mounted controls** provide immediate local operation capability – an operator can start or stop the motor, reset faults, and select local or remote control without needing any external control panel [16] . The included **graphical keypad/display**

(mounted on the door for easy access or portable for panel mounting) greatly aids in commissioning and monitoring. The EMX4i keypad features a multi-line LCD and menu navigation keys, with support for **multiple languages** (the interface can display full-text messages in English, Chinese, German, French, Spanish, Portuguese, Russian, etc., rather than cryptic codes) [27]. This makes it straightforward for personnel to understand status and diagnostic messages. Benshaw also provides a **Quick Start setup menu** that guides users through initial programming of key parameters (such as motor nameplate data, desired start/stop ramp times, and protection setpoints), which speeds up commissioning. Common application-specific settings (for pumps, fans, conveyors, etc.) can be configured easily using preset profiles or step-by-step assistants. Overall, the RX4E's packaging and user interface are aimed at *making the technology accessible*, even for those who may not be specialists in drives or soft starters.

Figure 2: Internal view of a Benshaw RX4E soft starter package (door open). On the right is the integrated circuit breaker (with its handle mechanism visible on the door) and below it the heavy-duty bypass contactor (orange Benshaw label). In the center, the blue module is the EMX4i soft starter controller (connected to the three-phase motor leads via SCR power modules and fuses at its base). The black units on the left door interior are additional control relays and terminals. This layout illustrates the combination starter design – breaker, soft starter, and contactor all contained in one unit – ensuring compactness and coordinated operation.

- **Advanced Digital Controller (EMX4i):** At the core of the RX4E is Benshaw's EMX4i soft starter control technology – a state-of-the-art digital platform that provides precise control over motor starting and stopping, plus a host of advanced features. The **EMX4i controller** offers multiple starting methods, including **Constant Current start** (the default method which maintains a user-set current limit throughout acceleration) and **Adaptive Acceleration Control**, which automatically adjusts the voltage ramp to achieve a specific acceleration profile (for example, a constant acceleration or a custom ramp shape). The constant current mode is very effective at minimizing the initial surge of current and torque – as noted by Benshaw, using a current-controlled start greatly reduces electrical and mechanical stress on the system [28]. For stopping, the EMX4i provides options like **TVR (Timed Voltage Ramp) Soft Stop** and **Torque Control** to ensure motors decelerate

smoothly. A standard soft stop (voltage ramp) simply extends the motor's coast-down by gradually lowering voltage, useful for preventing water hammer in pumps or sudden jerks in high-inertia systems. In fact, controlled deceleration is a major benefit for fluid systems: a gentle soft stop can **eliminate water hammer effects** that would otherwise occur when pumps stop abruptly, thereby protecting pipes and valves [29] [30]. Benshaw's EMX4i includes a feature called **Torque Vector Control** for stopping, which is akin to ABB's famed torque control soft stop – it manages the motor's torque during decel to mitigate surges. With this, the RX4E can **stop pumps gradually and avoid pressure spikes**, a capability also advertised by other leading manufacturers like ABB (whose PSTX soft starters use torque control to completely avoid water-hammer damage in pumping systems) [31]. In addition, the EMX4i supports **specialized start/stop functions** for unique applications: for example, a **"Pump Clean" mode can execute an automatic cleaning cycle** before a normal start, momentarily running the pump in reverse and forward to dislodge debris from an impeller [32] [33]. This pump clean function can repeat a few cycles and has configurable torque and duration settings, helping maintain pump performance in wastewater or slurry applications where clogs are a concern. Another capability is **Slow-Speed Jog** in forward or reverse, which can run the motor at a reduced speed (using phase angle control) for positioning tasks or inspection – this is useful in applications like conveyor belt maintenance or aligning a load without a full-speed start. Notably, the EMX4i also features an **Emergency Run mode (often called "Fire Mode")** which, when activated (typically by a fire system or similar override input), forces the starter to keep the motor running regardless of trip conditions [34] [35]. This is intended for critical scenarios (like smoke exhaust fans or pumps in fire control systems) where the motor must run to failure if necessary. In Emergency Mode, the soft starter will ignore overloads and other trips to continue operation – an extreme measure for mission-critical needs (the manual does caution that using this mode will void warranty due to the stress it can place on equipment [35]).

- **PowerThrough Limp-Mode Operation:** Unique to Benshaw's EMX4i (and the RX4E by extension) is a **PowerThrough function** that provides a measure of fault tolerance. If one SCR leg in the soft starter fails (e.g. a thyristor shorted in one phase), the EMX4i can detect it and automatically switch to a two-phase control algorithm to still start and run the motor on the remaining healthy phases [36]. Essentially, it enters a "limp along" mode using the two good phases to get the motor running – this is similar to a limp-home mode in automotive terms. The display will indicate a damaged SCR, but the motor can still be accelerated (albeit with slightly higher torque ripple) instead of being completely unable to start [37] [38]. This PowerThrough feature is meant for **critical continuous operations** where a repair might not be immediate; it allows the process to keep running until scheduled downtime can occur to replace the faulty module [39]. Competitors have introduced analogous features (for instance, ABB's PSTX refers to a "limp mode" in their soft starter which serves a comparable purpose of maintaining operation despite certain faults [40]). The inclusion of PowerThrough in the RX4E's arsenal is another indicator that this product is geared towards **mission-critical reliability** – even an internal component failure doesn't necessarily mean instant downtime. It should be noted that while PowerThrough can be a lifesaver in an emergency, it is typically a temporary measure – the system should be serviced as soon as feasible to restore full three-phase control.

- **Monitoring, Diagnostics, and Communications:** The RX4E soft starter not only controls and protects the motor, it also provides rich monitoring and diagnostic information. The EMX4i controller features a **full graphical LCD** that can display real-time measurements such as line voltages, phase currents, power factor, motor thermal capacity usage, etc. One particularly impressive feature is the

ability to view **real-time performance graphs** of motor data on the keypad display [41]. Users can observe a live graph of the motor's current over time (and optionally other parameters like thermal state or voltage) – this is extremely useful for commissioning to see the shape of the start current ramp or for troubleshooting erratic load behavior. The controller automatically logs events; it can store **up to 384 event records** in its internal memory with timestamps. These logs include trip events (with the trip cause), start/stop events, and warnings, which greatly aids in diagnosing what happened if a fault occurs. For instance, if an overload trip happened, the log might show the motor current prior to trip, duration, and cause. The keypad can display the last trip information in plain language (e.g. "Motor Overload Trip") so that maintenance staff aren't left deciphering codes. Additionally, the EMX4i has a **USB port** on the front (or accessible via the keypad) which allows direct connection to a PC. Through the USB, users can perform easy firmware upgrades to the controller, or download the event log and configuration data for analysis. Benshaw likely provides PC software tools to interface with the soft starter, enabling full parameter backup/restoration and live monitoring over a USB or network connection. On that note, the RX4E supports a range of **communication interface options** for integration into automation systems. The base unit includes an **RS-485 serial port** and the Modbus protocol as standard, and the design is modular such that optional communication cards can be added for industrial networks [42] [43]. Supported fieldbus protocols include **Modbus RTU/TCP, Ethernet/IP, DeviceNet, Profibus, and Profinet**, among others [42]. This means the soft starter can be tied into a plant SCADA or DCS system, allowing remote start/stop commands, status monitoring, and even programming over the network. In large facilities with many motors, having networked soft starters can significantly improve visibility and control for engineers. The RX4E's communications and diagnostics capabilities put it on par with the most advanced soft starters on the market – it essentially can function as a smart motor control node in an IIoT (Industrial Internet of Things) environment.

- **Rugged Construction and Quality:** Benshaw has a reputation for building **rugged, industrial-grade motor control equipment**, and the RX4E continues that tradition. The enclosure is fabricated with heavy gauge steel and quality powder coating, suitable for factory environments. All internal components (breaker, contactor, SCRs, control boards) are sourced or designed for longevity under frequent operation. For example, the SCR power devices are likely **rated for millions of operations** given the short duty during each start, and are protected by semiconductor fuses. Benshaw's design also emphasizes serviceability – components like the contactor or breaker are standard items that can be replaced if ever needed, and the EMX4i controller is modular. The use of a **proven EMX series control platform** (which Benshaw has iterated over multiple generations, often in collaboration with motor control specialists) means that the control algorithms and protections have been field-tested extensively. Benshaw's own literature often highlights their experience in mission-critical applications (mining, oil & gas, etc.), which feeds into the product design. In the RX4E, even small details show this focus: for instance, the **display includes a dynamic QR code** feature – when a trip occurs, it can show a QR code on screen that links to online help for that specific fault. This innovative touch means technicians on site can scan the code with a smartphone and immediately get troubleshooting advice or documentation for the error, minimizing time to resolve issues. Such features underscore the manufacturer's attention to detail in supporting the end-user under tough conditions. It's also worth noting the RX4E is **manufactured in North America** (with Benshaw's facilities in Pittsburgh, and in Canada for certain models), and the units carry cUL listings for use in both the US and Canada. This ensures compatibility with local codes and standards. All these factors combine to give end users confidence that the RX4E can **withstand industrial abuse** and continue to operate reliably over the long term – crucial for high-value motors and processes.

Applications and Use Cases

Soft starters like the Benshaw RX4E are used across a wide range of industries wherever **AC induction motors** drive heavy loads. The RX4E's features make it especially suitable for applications that demand *reliable starts, minimal stress, and continuous availability*. Some common application areas include:

- **Pumping Systems:** In water supply, wastewater treatment, and industrial fluid handling, large pump motors benefit greatly from soft starters. The RX4E can ramp pumps up smoothly to avoid pressure surges in piping. Its soft stop (TVR or torque control) is valuable for pumping stations because it prevents the sudden flow reversal that causes **water hammer**, thereby protecting pipes and valves from shock [44]. For example, a municipal water pump running DOL might cause pipeline hammering on stop, but with an RX4E soft stop over several seconds, the flow decays gently and virtually no hammer occurs. The pump clean function is directly aimed at these users, allowing periodic automatic cleaning cycles for pumps that handle solids or sludge. Additionally, in scenarios like firefighting pumps or critical cooling water pumps, the RX4E's emergency run mode ensures the pump motor can be kept running no matter what, which could be life-saving for facility safety. Many water/wastewater facilities also appreciate the soft starter's reduction of starting current, as it prevents generator-backed pump stations from tripping or avoids dimming lights on weak rural grids when a big pump motor kicks in. The RX4E's fieldbus communication options mean it can integrate into SCADA systems for water plant automation easily.

- **HVAC and Fans:** Large fans, blowers, and compressors in HVAC systems (e.g. chiller compressors, cooling tower fans, air handlers) often use soft starters to reduce mechanical wear and avoid huge current draws that can destabilize the power supply. With an RX4E on a fan, the start is gentle – belts and couplings see less shock, and the motor is up to speed without causing voltage sags. In fact, because HVAC fans frequently cycle on/off to meet building load, a soft starter can significantly extend the life of both the motor and driven equipment by **minimizing each start's impact** [45]. Using the RX4E in an HVAC context also means easier compliance with regulations on inrush current (some utilities penalize installations that draw excessive starting current from the grid). The RX4E's ability to connect to building management systems (via BACnet/IP or Modbus, etc., using appropriate gateways) is useful for facility managers to monitor and control the motor operations remotely. Additionally, soft stopping can prevent sudden airflow cut-off or duct pressure spikes for large ventilation fans.

- **Conveyors, Crushers, Mills:** In manufacturing, mining, or aggregate facilities, conveyor belts and crusher mills are commonly started with soft starters to avoid mechanical stress like **belt slippage** or chain breakage. A fully loaded conveyor, if started across-the-line, could jerk violently, potentially spilling material or overstretching the belt. The RX4E allows a smooth acceleration so that the conveyor begins moving gradually, protecting both the equipment and the product on the belt [46]. In mining or cement plants, **ball mills** and crushers have very high inertia and can draw enormous current at startup; soft starters are almost a necessity to get them turning without blowing fuses. Benshaw actually highlights case studies where their soft starters were used on ball mill applications – by using a soft starter with a specialized **synchronous motor excitation control**, they were able to bring a 1250 HP mill motor to speed and synchronize it, while **eliminating high inrush currents and reducing mechanical stress** on the system [47]. The RX4E (low-voltage) targets smaller mills or high-torque machines and can similarly benefit any heavy-duty conveyor or crusher. Its robust design (450% for 30s) means even difficult loads that need a long starting time (perhaps a long

conveyor starting fully loaded with material) can be handled without the starter overheating. Additionally, the **jam/stall protection** in the RX4E will detect if a conveyor is jammed or a crusher is locked up and trip promptly to prevent motor burnout – a valuable safety net in these industries.

- **Compressors and Pumps in Oil & Gas:** The oil and gas sector often employs large motors for compressors (e.g. gas compressors, injection pumps) and here soft starters help avoid torque stress on couplings and reduce peak power demand. The RX4E's heavy-duty rating and advanced motor protection suits the high reliability demands of these operations. For example, a gas pipeline compressor station might have a 500 HP motor that needs to start under load; an RX4E can limit the current and smoothly accelerate the compressor, preventing pressure spikes in the gas and protecting the engine from torque shock. Moreover, the hazardous-area or remote nature of some oilfield installations means that downtime is extremely costly – having the RX4E's redundancy (the bypass mode) and fault-tolerant PowerThrough feature can keep the site running even if the soft starter electronics encounter issues. The event logging and remote communication also allow central monitoring of these critical motors for preventive maintenance.

- **Manufacturing and Plant Machinery:** In general industry – from sawmills to bottling plants – any large motor driving something like a **flywheel, mixer, grinder, or centrifuge** is a candidate for the RX4E. For instance, starting a large industrial mixer with thick contents can draw a lot of current; the soft starter's current limiting will prevent blowing the plant's main breaker. It also avoids mechanical shock to the mixer blades or gearbox. Once running, the soft starter bypass ensures efficient operation. Many plants also use generators for backup power; soft starters can enable more motors to run on generator by reducing the starting kVA required. The RX4E's flexible configuration (local/remote control, network integration) means it can be adapted to many control schemes in manufacturing lines. It can operate standalone or be commanded by a PLC as part of an automated sequence.

In all these applications, the **primary benefits** realized by using the Benshaw RX4E (or any high-performance soft starter) are: **extended equipment life, reduced electrical infrastructure stress, and improved process reliability.** Motors started with the RX4E run smoother – avoiding the violent mechanical jerks that cause wear on gears, belts, couplings, and bearings. Over time, this can translate to significantly lower maintenance costs and less unplanned downtime. For example, one case study documented the replacement of a DOL starter with a soft starter on a 30 kW conveyor motor; the result was a **~55% reduction in peak starting current** and the elimination of nuisance breaker trips and mechanical issues during start [48]. The operators noted improved reliability and no required motor maintenance in the period after the soft starter was installed [48]. This kind of improvement is typical – by curbing the inrush current, the soft starter eases the strain not just on the motor but on the whole electrical system (transformers, cables, and generators see less stress).

Additionally, soft starters can contribute marginally to energy savings in systems with frequent starts by reducing the heat dissipated during each high-current start. While they are not energy-saving devices during run (once bypassed, they don't affect the running efficiency significantly, being ~99% efficient [13]), the avoided stress and downtime itself is a huge cost saver for facilities. The RX4E also includes features that can automate certain functions (like the pump cleaning or auto-start sequences via clock/timer settings in the controller) which can further improve operational efficiency.

It's important to choose the right size and configure the parameters properly to fully realize these benefits – Benshaw provides selection guidelines and even **soft starter selection software** [49] [50] to help engineers pick the correct model based on motor FLA, load type, and desired ramp profiles. The RX4E series, with its heavy-duty design, often has a bit of **extra capacity** built-in. For example, when starting a motor with a particularly tough load, the user can program the start current to a higher level (within that 450% limit) to get more torque if needed, or extend the ramp time, and the device can handle it. This flexibility is why the RX4E soft starters find use in such a broad array of sectors – from HVAC systems in large commercial buildings to mining conveyors in remote pits. Wherever there is a need for **reduced mechanical wear, limited inrush current, and high reliability**, a product like the Benshaw RX4E shines.

Conclusion

The Benshaw RX4E Series Softstarter is a comprehensive motor starting solution that marries **powerful hardware** with **sophisticated control algorithms**. By providing gentle, controlled motor acceleration and deceleration, it solves many problems associated with traditional motor starters: voltage spikes, mechanical shock, and high starting currents are all mitigated. The RX4E's design – combining a solid-state soft starter, line isolator, and bypass contactor in one package – delivers both convenience and reliability. Features like dual redundant starting modes (soft start or full-voltage), advanced motor protection functions, and real-time monitoring tools set the RX4E apart as a **mission-critical grade soft starter**. It brings benefits in extended equipment life and improved uptime, which ultimately contribute to lower total cost of ownership for motor-driven systems.

In today's industries, where efficiency and reliability are paramount, the Benshaw RX4E helps companies strike that balance: it reduces the strain on electrical networks and mechanical drivetrain components without sacrificing the performance or availability of the motors that drive production. Backed by Benshaw's long experience in motor control and a solid three-year warranty, the RX4E Softstarters are positioned as a **trustworthy choice for heavy-duty motor control** needs. Whether it's preventing water hammer in a pipeline, keeping a critical fan running through a power glitch, or simply reducing the wear-and-tear on a conveyor system, the RX4E provides a proven, modern solution. With its blend of broad **technical capabilities** (spanning high horsepower ranges and integration options) and deep **application-focused features** (like pump clean and emergency run), the Benshaw RX4E exemplifies the state-of-the-art in low voltage soft start technology, ready to help customers solve real-world motor control challenges across diverse industries.

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