Benshaw RB3 Softstarters – Features, Specifications, and Benefits

Introduction

The **Benshaw RB3 Series Softstarters** are advanced solid-state motor starters designed to smoothly control the acceleration and deceleration of three-phase electric motors. Soft starters like the RB3 limit inrush current and torque during startup, providing a **gentle ramp-up** of power instead of the abrupt jolt from across-the-line starters. This reduces the **mechanical stress** on motors and connected equipment, extending their lifespan and improving reliability [1] [2]. The RB3 series, in particular, combines Benshaw's latest MX3 digital control technology with a rugged power section to deliver **greater control and protection** in motor starting and stopping [3] [4]. In this comprehensive overview, we'll explore the RB3's technical specifications, key features, and how these soft starters help solve common motor starting challenges.

Overview of Benshaw RB3 Series Softstarters

The **Benshaw RB3** is a **low-voltage open-chassis soft starter** (for motors up to 600 VAC) that comes standard with an **integral bypass contactor** and extensive built-in motor protections. The open-chassis design means the unit is intended to be mounted inside a suitable enclosure (it has no standalone NEMA rating), which Benshaw makes easier by minimizing heat generation. The **integral bypass** closes after the motor is at speed, eliminating most of the power loss in the thyristors and reducing heat – this allows RB3 starters to be used even in **non-ventilated (sealed) panels** without overheating [3]. In other words, when running at full speed the RB3's bypass contactor carries the load, so the soft starter generates very little waste heat, an advantage for installation flexibility.

Each RB3 unit is a **solid-state reduced-voltage starter** using back-to-back SCRs (thyristors) on each phase to ramp the motor voltage during startup. Benshaw's MX3 control system governs the SCR firing to provide a smooth voltage ramp (or torque ramp, depending on settings) until the motor reaches full speed. The result is a **controlled acceleration** that avoids the high electrical peaks and mechanical shock of direct-on-line starts. According to Benshaw, the RB3 is a "rugged, compact, simple to use soft starter with built-in motor protection" capable of giving users greater finesse in starting and stopping motors [5]. The design is modular, with separate phase modules for ease of maintenance, and includes a **removable LCD keypad** for programming and monitoring. The keypad can be door-mounted, and the RB3 can also be commissioned or controlled via **Modbus communications** or optional network interface cards (for protocols like DeviceNet, Profibus, Ethernet/IP, etc.) [6] [7].

Power Range and Ratings: The RB3 series covers a wide range of motor sizes in the low-voltage class. Models are available for **line voltages from 208 VAC up to 600 VAC**, and current ratings roughly from ~30 A up to 590 A. In practical terms, a single RB3 soft starter can handle motors from as small as around 5–10 HP, up to about **1000 HP** (for higher voltage motors) in standard duty applications [8]. For example, at 460 V the RB3 line is rated for approximately 20–1000 HP motors, and at 575 V up to ~1000 HP as well [8]. This

wide range makes the RB3 suitable for both small pumps/fans and very large industrial machines. All RB3 units use a **120 VAC control power supply** for the electronics (a control transformer is typically used if the line voltage is higher); a 24 V control option is not offered on this series [9]. Each starter is **three-phase, three-wire** in standard configuration, but the RB3 can also be connected in **inside-delta (6-wire)** configurations for special applications to reduce the current through the starter (this requires a compatible motor wiring and proper setting adjustments) [10] [11].

Start Duty Classes: Benshaw provides the RB3 softstarters with multiple duty ratings to match different application requirements. There are three main duty classes selectable for RB3 units [12]:

- **Standard Duty:** Rated for approximately **350% of motor full-load current for 30 seconds**. This is suitable for easier starts (e.g. centrifugal pumps, fans, etc.) and corresponds roughly to an AC-3 or Class 10 motor starter duty.
- **Heavy Duty:** Rated for up to **500% of FLA for 30 seconds**. This higher current capacity for starting is intended for more demanding loads or more frequent starts (e.g. conveyors, loaded compressors). Heavy duty corresponds to about a Class 20 overload setting.
- **Severe Duty:** Rated for roughly **600% of FLA for 30 seconds**. This is used for extremely hard-to-start loads (high inertia or high friction starts) where very high starting torque is needed, such as crushers or large fans with damper closed. Severe duty use aligns with a Class 30 thermal rating [12].

These duty ratings affect the maximum motor HP a given RB3 model can handle in each mode. Essentially, the same hardware can start a larger motor if the load is easy (standard duty), but for heavy or severe starting conditions the HP must be derated to limit thermal stress. For example, one RB3 model (RB3-1-S-040A-11C) is listed at 30 HP @ 480 V for standard duty, but only 15 HP if used in a severe-duty (600% start) scenario [13] [14]. When selecting an RB3 soft starter, the user chooses a model based on both the motor's horsepower and the start duty needed for the application. Benshaw's documentation advises selecting the duty class appropriate to the load characteristics to ensure adequate starting torque without tripping.

Every RB3 soft starter comes with **Benshaw's 3-year warranty**, reflecting the company's confidence in the product's robustness [13]. The devices are **UL certified (UL 60947-4-2 / CSA C22.2 No. 60947-4-2)** for motor controller safety standards, and are designed to meet IEC requirements for AC semiconductor motor starters. Benshaw also offers globally recognized certifications – for instance, the RB series soft starters carry cUL listings for use in Canada, and certain models even have options for **Lloyd's Register** compliance for marine applications [15]. In short, the RB3 is built to industrial standards for use worldwide.

Key Features and Advanced Capabilities

MX3 Control Technology and Motor Protection

At the heart of the RB3 series is Benshaw's advanced **MX3 control technology**. This is the third-generation digital controller platform from Benshaw (building on their earlier MX2 system), and it greatly expands the functionality and protection features of the soft starter. The MX3 controller provides **full electronic motor protection**, eliminating the need for separate overload relays or motor protection units in the starter panel [16] [17]. Key protective functions integrated in the RB3 include:

- **Adjustable electronic overload** (thermal modeling) with user-selectable tripping class (to protect against overheating from overcurrent)

- **Instantaneous overcurrent (short-circuit) trip** and **current limiting** during start (to prevent excessive peaks)
- **Phase loss and phase imbalance protection** – it will detect if one phase is lost or significantly lower (unbalance), preventing single-phasing the motor [18] [19].
- **Under-voltage / Over-voltage protection** – monitors supply voltage and can trip on sustained abnormal voltages outside set limits [20].
- **Ground fault protection** – the RB3 can detect ground faults via residual current (vector sum) or via a zero-sequence CT input; it supports both methods with adjustable sensitivity [21].
- **Motor temperature monitoring** – the MX3 supports an input for a motor PTC thermistor, and also can work with an external RTD module to monitor up to 8 RTD sensors (e.g. in motor bearings or windings) [22] [23]. It provides alarms for RTD over-temperature or open/failed sensors (ANSI 38, 49).
- **Stall, Jam, and Load Loss detection** – it has an adjustable **stall timer** (to trip if the motor fails to reach speed in time, ANSI 48) and a **mechanical jam** function to trip if a running motor stalls under load [24] [25]. Conversely, it also has **undercurrent protection** (ANSI 37) to sense loss of load (e.g. a pump running dry) [26].
- **Phase rotation check** – the RB3 can verify the phase sequence (ABC vs CBA) and detect single-phasing or phase reversal before allowing a start (important if correct rotation is needed or if one line is disconnected) [19].
- **Frequency and power factor trips** – it can detect out-of-range supply frequency (ANSI 81) and even a power factor drop (which can indicate light load or other issues), as additional protective features [27] [28].

This comprehensive suite of protections corresponds to many standard motor protection relay functions (often referenced by ANSI device numbers as noted). Having them built into the soft starter's controller means an **RB3 can safeguard the motor and itself without external relays**, simplifying the control panel design [16]. For example, instead of using a separate thermal overload relay, the user programs the motor's full-load amperage into the RB3 and selects a trip class (e.g. 10, 20, 30), and the MX3 will trip out if the motor is overcurrent for too long. Benshaw even highlights that the RB3's capabilities **"eliminate the need for a third-party motor protection relay"**, as the device itself already performs those functions [16]. All trip events, warnings, and status conditions are recorded in an **event log** (with time stamp, thanks to a built-in real-time clock). The MX3 controller maintains a log of up to **99 events** including trip causes, which is invaluable for troubleshooting and maintenance [29] [17]. Operators can review the event history via the keypad or over communications to analyze what happened during a fault (for instance, seeing if a fault was due to phase loss, overload, etc., and at what time).

Another advanced capability of the MX3 control is the **programmable ramp profiles**. Users can configure the **start ramp** to be **voltage ramp** or even **torque ramp** (the RB3 can adjust voltage based on calculated motor torque feedback for a more linear acceleration, useful for certain loads). The **initial voltage** and **ramp time** are adjustable to fine-tune the startup. For stopping, the RB3 offers an **adjustable soft stop (voltage deceleration)** which is especially useful for pump applications to mitigate water hammer. Rather than the pump slamming to a stop (causing pressure surges in pipes), the soft starter can gently ramp the voltage down, gradually slowing the pump and avoiding hammering in fluid systems [30] [17]. This *soft-stop* feature is often critical in water/wastewater facilities – by preventing water hammer, it **reduces stress on pipes and valves**, protecting the system from damage [31]. In fact, soft starters are widely adopted in municipal pumping stations and treatment plants for this reason: the RB3's ability to control stop as well as start makes it ideal for such applications.

MX3 control also includes some unique features: for example, Benshaw's **patented "CYCLO" control** mode which allows **slow-speed jogging** of the motor at approximately 0–40% of normal speed [28] [32]. In Cyclo mode, the soft starter uses phase angle control in a special way to produce a low frequency, reduced-voltage output, effectively inching the motor. This can be used for positioning tasks or to slowly turn a machine for inspection. The RB3 can do this in both forward and reverse at user-set low speeds [32]. Not all soft starters on the market have this feature – it provides a bit of variable speed capability without needing a VFD, albeit only at very low speeds and torque. Along with that, the RB3 includes a **"backspin" timer** and lockout function (to prevent restarting a motor that is coasting backwards, such as a pump that's spinning reverse due to backflow) [33]. A **start-per-hour limiter** and minimum **time-between-starts** setting are also configurable, so the user can ensure the motor isn't re-started too frequently (protecting against overheating) [34] [27]. All these features reflect a very *feature-rich controller*, aiming to cover all aspects of motor protection, safe operation, and flexibility in one package.

User Interface and Connectivity

Operating and configuring the Benshaw RB3 softstarter is made convenient through multiple interface options. On the front of the unit (or available for panel-door mounting) is a **multi-line LCD keypad**. This **remote mount keypad** comes with the RB3 and allows full programming of parameters, as well as real-time monitoring of electrical values (like current, voltage, power factor, etc.) and status. The keypad has a menu-driven interface where you can adjust settings for all the features mentioned (e.g. set the overload trip class, adjust ramp times, view event logs, etc.). The real-time clock in the RB3 means time-stamping of events and scheduling functions are possible – the MX3 even supports **scheduled starts/stops or routine operations** via its internal timer functions (for example, you could schedule the starter to run a motor at certain times of day, useful for automated processes) [35] [36]. The keypad also displays diagnostic messages in plain text, which simplifies troubleshooting compared to older starters with just LED blink codes.

For remote control and integration into automation systems, the RB3 provides a standard **Modbus RTU** serial communication port (RS-485). This allows a PLC or plant SCADA system to read data from the starter (like motor currents, status, fault codes) and to issue commands (start, stop, reset, etc.) over a network. In addition, Benshaw offers optional plug-in interface cards for various industrial networks – including **DeviceNet, Profibus, Modbus TCP/IP, and Ethernet/IP** – for the RB series starters [6]. With these options, the RB3 can communicate on most common fieldbus systems, making it easy to integrate into modern Industry 4.0 environments. As an example of the industry trend, newer soft starter lines such as the Siemens 3RW55 and ABB PSTX also include Ethernet communications and even cloud connectivity for monitoring [37] [38]. Benshaw's RB3, with its Modbus and optional Ethernet capabilities, aligns well with these modern requirements. Having communications means maintenance personnel can retrieve performance data or event logs remotely, and even adjust settings via software tools, reducing the need for onsite intervention. The RB3's controller can thus be part of a plant-wide monitoring system – for instance, it could send an alert if a motor drew overcurrent or if a start was aborted due to a fault, allowing proactive maintenance.

In terms of I/O, the RB3 is quite flexible. It includes **eight (8) user-configurable discrete inputs** [39]. These can be programmed for various control or interlock functions (for example, separate start/stop commands, external trip signal, reset input, or multi-step starting profiles). In addition to the user inputs, there are **two dedicated inputs**: one reserved for the Start command and one for a "bypass confirm" (to sense that the bypass contactor has engaged properly) [40]. On the output side, the RB3 provides **six (6) programmable**

relay outputs that can be assigned to statuses like “At Speed”, “Fault Alarm”, “Ready”, etc., to interface with external pilot lights or systems [41]. There is also one fixed relay output dedicated to controlling the internal bypass contactor [42]. This abundance of I/O allows the RB3 to serve in complex control schemes without additional relays – for example, one could program an output to trip upstream breakers or to operate cooling fans when the motor is running. The MX3’s programmability even extends to specialized inputs like a **zero-speed switch input** (for confirming motor rotation has stopped before allowing a reverse or for anti-windmill protection on fans) [33]. There’s also an input for a **shunt trip** or external shutdown that can directly trigger a breaker or contactor. Overall, the RB3’s control interface is **feature-packed and highly configurable**, which helps engineers tailor the starter to their exact application needs.

Robust Construction and Design

The “RB” in RB3 stands for **“Rugged Bypass”**, hinting at the design philosophy. The power section of the RB3 uses a **modular three-phase stack** of SCRs with each phase in a separate module assembly [43] [7]. This modularity is beneficial for maintenance – if one phase were to have an issue (say an SCR failure), that phase module can be serviced or replaced independently. The SCRs are properly heatsinked, and since the bypass contactor takes over in run, the SCRs conduct only during starting and stopping (or if soft stopping). This means the thermal stress on the SCRs is limited to short periods, enhancing the starter’s endurance for many start cycles. Benshaw’s design emphasizes heavy-duty construction; these starters are intended for **severe duty industrial environments**. All control electronics are engineered to handle electrical noise and temperature extremes – the RB3 is specified for operation from -40°C up to +60°C ambient in many cases (with possible derating at high end) [44], and the control boards likely have conformal coating for humidity (up to 95% non-condensing allowed). The **separate poles per phase** design also inherently creates some spacing and helps cooling airflow when enclosed.

Because the RB3 is an open chassis unit, it’s typically mounted inside a user-supplied enclosure or motor control center bucket. For smaller frame sizes (under ~100 A), the units have IP20 finger-safe shields, whereas larger sizes are essentially IP00 (no finger protection) since they rely on the cabinet for safety [45]. The integral bypass contactor is built into the same assembly, so no additional external contactor is required for bypass – this not only saves panel space but also ensures the bypass is properly coordinated and wired. The control terminals and power terminals are all easily accessible on the chassis for installation. Benshaw also provides a **RediStart “Start Here” mobile app** and selection tool to help users size and pick the appropriate soft starter model for their motor and application [46]. Once installed, the RB3 units are known for their straightforward setup. In industry forums, users have commented that Benshaw soft starters are *“really easy to setup and install, very simple to operate”* even on large motors [47]. The RB3’s combination of user-friendly interface and rugged hardware means it can quickly be commissioned and will hold up under continuous industrial use.

Applications and Benefits in Operation

Soft starters like the RB3 are used across many industries to solve problems associated with motor starting. Some common applications include **pumps, fans, compressors, conveyors, crushers, mills, mixers, and large HVAC systems**. Essentially, any AC motor that does not require variable speed during normal run (unlike a VFD, a soft starter doesn’t modulate speed once the motor is up to full voltage) but would benefit

from a controlled start can be a good candidate. Below we highlight some key benefits and real-world use cases of the RB3 soft starter:

- **Reduced Electrical Stress and Peak Current:** When an induction motor starts across-the-line (DOL start), it can draw 6–8 times its rated current, causing voltage dips and high thermal stress. The RB3 limits this inrush current to the set level (e.g. 350% of FLA in standard duty). This protects the electrical supply network from dips and prevents nuisance trips of breakers or generator overloads. For facilities with large motors, using soft starters can avoid the need to oversize backup generators or transformers. In one practical example, an HVAC equipment manufacturer using soft starters was able to **reduce motor starting current by 60%** compared to direct startup [48]. This means a much lower spike on the power system at each start, translating to fewer heating losses and potentially lower peak demand charges from the utility. Reduced current also means reduced **electrodynamic forces** on cables and switchgear, enhancing the longevity of the entire electrical system [1].

- **Minimized Mechanical Wear and Shock:** A standard DOL start causes an immediate application of full torque to the motor and driven machine. This often results in a jerk or "hammer" effect on couplings, gearboxes, belts, and the product being moved (for example, a conveyor belt lurching can spill material, or a pump can cause a pressure surge). By ramping up voltage (or torque) gradually, the RB3 **smoothly accelerates the load**, **eliminating jerks**. The mechanical benefit is significant: machinery sees much less strain, which prevents premature failures. For instance, in industrial conveyor and crusher applications, using soft starters has been shown to **decrease maintenance needs and downtime** – one case study reported that mechanical breakdowns were greatly reduced, cutting maintenance costs by around **40% after implementing soft starters** on heavy-duty motors [49]. Similarly, in pumping systems, the soft stop capability of the RB3 **prevents water hammer**, as noted earlier, saving pipes and valves from shock [31]. Over time, these reductions in stress mean **longer equipment life** for both the motor and the driven machine. Many RB3 users see extended bearing lives, less coupling wear, and fewer belt replacements.

- **Energy Savings and Reduced Heat:** While soft starters are not primarily energy-saving devices (once the motor is at full speed, the RB3 bypass engages and the motor runs at full voltage), they can indirectly save energy by reducing waste during starting. By limiting starting current, I^2t losses in the motor windings are reduced during each start. Also, because the RB3's bypass contactor shunts the SCRs during run, the **running losses of the starter are minimal** (SCR voltage drop is removed). In scenarios with frequent starts and stops, using a soft starter can lower the overall heat generated in the motor as compared to across-the-line starting, which in turn keeps the motor cooler and slightly more efficient. Moreover, soft starters can contribute to system efficiency by enabling the use of smaller generators or avoiding utility penalties. As Schneider Electric points out in comparing starting methods, using soft starters instead of DOL can allow significantly smaller genset sizing – a soft starter has an effective starting kVA factor around 3x the motor load, versus 6–7x for DOL [50] [51]. This means backup generators can be almost half the size when soft starters are used, saving fuel and capital cost. In summary, while a **variable frequency drive (VFD)** is the go-to for dynamic speed control and maximum energy savings on variable loads, a soft starter like RB3 is a simpler, more cost-effective solution for fixed-speed motors where just the **start/stop control** is needed. The RB3 avoids the higher cost and complexity of VFDs yet still provides *optimized starts that can yield energy and cost benefits* in many applications.

- **High Duty and Severe Application Capability:** The availability of heavy and severe duty ratings in the RB3 line means it can tackle hard-starting loads that many basic soft starters cannot. For example, starting a high-inertia load like a **ball mill** or rock crusher often requires a large torque push. Benshaw's soft starters have been successfully used on such applications – in one instance, a 1250 HP **ball mill motor** was retrofitted with a Benshaw medium-voltage soft starter solution, which **eliminated the high inrush currents and substantially reduced mechanical stress** on the mill during start [52]. While that case was medium voltage, the same principle applies with low-voltage RB3 units driving large fans, mixers, or chippers. The **600% (6×) severe-duty capability** allows the motor to produce near locked-rotor torque for a short time to overcome load inertia, without resorting to more complex starters or sacrificing the benefits of a soft start. The RB3's robust build and thermal modeling ensure that even under these heavy starts, the starter will protect itself and the motor (for example, by cutting off if a start takes too long or the motor stalls). This makes the RB3 suitable for **demanding industries** like mining, cement, or oil & gas, where equipment must start reliably under tough conditions. Additionally, features like **power dip ride-through** (PORT), where the RB3 can ride through brief supply voltage drops without tripping, provide extra reliability in facilities with unstable power [53].

- **Ease of Use and Integration:** From an end-user perspective, the RB3 softstarter simplifies both installation and operation. Because it integrates so many functions (starter + overload relay + many protective relays + metering), it **reduces the number of separate components** needed in a motor control panel. One case study from ABB noted that using advanced soft starters in a project **cut the number of components by 80% and halved the panel cost** for a pumping system, while also shortening installation time by 60% [54] [55]. While that example was with ABB's product, the RB3 offers a similar level of integration – its built-in bypass, extensive protections, and comms mean you add essentially just a circuit breaker for short-circuit protection and you have a complete motor starter solution. Fewer components and wiring not only reduce initial cost but also improve reliability (fewer points of failure) and make troubleshooting easier. The RB3's **event log and diagnostics** are a boon for maintenance teams – instead of mysterious trips, the unit will tell you exactly why it tripped (e.g. "Overload Trip on Phase loss" or "Undercurrent – Pump Dry"). This can drastically cut troubleshooting time. Furthermore, the ability to connect the RB3 to a plant's automation system allows remote monitoring of motor performance. Trends in motor current or frequent trip alarms can be spotted early, enabling **predictive maintenance** on the motor or the driven load before a catastrophic failure occurs [56] [57]. Overall, these features empower facility operators with better control and oversight of their motor-driven processes, ultimately improving uptime and safety.

Best Practices for Implementation

When deploying a Benshaw RB3 softstarter, there are a few best practices and considerations to keep in mind to maximize its benefits:

- **Proper Sizing and Duty Selection:** Always evaluate the motor and load to choose the correct RB3 model and starting duty. Gather information on the motor's full load amperage, service factor, and the load's starting characteristics (is it a hard start or easy start?). Use Benshaw's selection charts or software to pick a unit that can handle the motor HP in the required duty class [13]. If in doubt, err on the side of a higher duty or larger size to ensure reliable starts. Remember that for high-inertia or high-friction loads (e.g. positive displacement pumps, long conveyors, fans with closed dampers), using the **Heavy or Severe** duty rating is advisable to get additional starting torque. The RB3's

programmable current limit should be set according to the chosen duty (for example, ~350% for standard duty) – setting it higher than the hardware's capability could lead to trips. Also set an appropriate **acceleration time**; too short a ramp can defeat the purpose by causing a current spike, whereas too long a ramp can overheat the motor. Benshaw provides guidelines: typically a 10–30 second ramp is used, depending on the application.

- **Control Wiring and Integration:** Plan the control scheme leveraging RB3's I/O to simplify wiring. For instance, you can use one of the programmable outputs as an **"At Speed" indicator** to signal another process to start only after the motor is up to full speed. If the application requires emergency stopping, note that a soft starter cannot **stop faster** than coast (unless it has DC injection brake, which the RB3 does not explicitly list, though it does have a "soft brake" function for pumps [58]). For critical stops, an external brake or VFD might be needed. The RB3 **Safe Torque Off (STO)** is not a built-in feature of this series (some newer soft starters have SIL-rated STO inputs [59]), so for safety-critical applications you should still use a safety contactor in series or ensure the RB3's control circuit design meets the required safety standard (e.g. triggering a shunt trip via an RB3 output to drop power). When using the **Modbus or network communication**, follow Benshaw's addressing and baud rate setup in the manual. It's a good practice to test the communications in a PLC/SCADA environment during commissioning to ensure all required data points (like starter status, motor current, fault codes) are mapping correctly. This will facilitate smooth integration into any predictive maintenance or energy monitoring systems you have.

- **Enclosure and Thermal Management:** Since the RB3 is open chassis, it must be mounted in an enclosure that protects it from dust, moisture, and unauthorized contact. Ensure the enclosure size and ventilation (if any) adhere to Benshaw's heat dissipation guidelines. Thanks to the built-in bypass, **heat generation is low** once the motor is running, but during starting the SCRs will produce heat proportional to the motor current and ramp time. For multiple soft starters in one cabinet or MCC, consider segregating them or using vertical airflow management so the heat from one doesn't affect another. Also, maintain clearance around the power terminals and heatsinks as specified. If installing in a **non-ventilated enclosure**, check that the soft starter's watt loss (given in the manual for starting and running) will not cause the internal temperature to exceed limits. The RB3's ability to run in sealed enclosures is a plus [3], but long or frequent start cycles can still accumulate heat. Use of a small enclosure fan or heat exchanger might be necessary for very high duty cycle applications to keep things cool.

- **Commissioning and Tuning:** When first powering up the RB3, program the basic parameters: motor FLA, service factor, desired ramp type, and any critical protection setpoints (like ground fault sensitivity if a ground CT is used, or underload trip if it's a pump that shouldn't run dry). It's recommended to perform a **dry run simulation** if available – Benshaw's MX3 has a simulation mode where you can test the control circuit logic without actually energizing the motor [60]. This is useful to verify that your start/stop commands and interlocks are functioning as intended. Once ready for a live test, watch the motor's behavior during the first few starts and adjust the **initial voltage** setting if the motor has trouble beginning to turn. For example, high friction loads might require a higher kick of initial voltage (or use the RB3's "Kickstart" feature, which provides a brief boost of torque to breakaway) [61]. Conversely, if the motor starts too abruptly, you can lower the initial voltage. Monitor the peak current via the RB3's metering during ramp-up to ensure it's within expected limits. If the RB3 trips on a fault during tuning, consult the event log – it will clearly state the reason. Common adjustments during commissioning include lengthening the ramp time if **Excess Start**

Time trips occur, or increasing the current limit if the motor isn't reaching speed. Fortunately, the MX3 control allows these changes on the fly and even offers built-in help via the keypad for parameter descriptions.

- **Maintenance:** The RB3 softstarter itself is **solid-state with few moving parts**, so it requires minimal maintenance. The main thing is to keep it free of dust and check that all power connections remain tight (heat/cool cycles can loosen lugs over time). It's wise to include the RB3 in routine IR thermography scans – looking at the SCR connections and bypass contactor connections under load to spot any hot spots that might indicate a loose joint or wear. The bypass contactor in the RB3 will engage on every start; over years of heavy use, its contacts may wear and could eventually need replacement or adjustment (though Benshaw's bypass is built for the life of the starter in normal use). Because the RB3 logs events, maintenance personnel should periodically review the log for recurring warnings (for example, if you see many under-voltage warnings or frequent starting attempts, it might indicate upstream power issues or an operator misuse that should be addressed). Should an SCR ever fail, Benshaw's modular design makes it possible to replace a single phase module rather than the whole unit. Always follow proper lock-out and safety procedures when servicing. On the motor side, using the soft starter should actually **reduce maintenance** requirements – motors run more smoothly and are less likely to have bearings or couplings fail due to start/stop shock. One user testimonial noted they have used Benshaw starters on motors from 5 HP to 400 HP and found them "very easy to set up" and effective, implying a positive impact on their operations [47].

Conclusion

The Benshaw RB3 Series Softstarters bring together robust hardware and sophisticated control features to offer a **comprehensive motor starting solution** for a broad range of industrial needs. By combining a heavy-duty SCR power section (with an integral bypass contactor) and the intelligent MX3 controller, the RB3 provides not only **smooth motor acceleration and deceleration**, but also full-spectrum **motor protection, monitoring, and diagnostics** in one package. This integration simplifies motor control installations and enhances the safety and longevity of both the motors and the driven equipment.

In use, the RB3 soft starters distinguish themselves through their **versatility** – they can be tailored to everything from a simple pump start to a high-inertia crusher application, thanks to programmable profiles and multiple start duty ratings. They exemplify the benefits that modern soft starters offer: **reduced peak currents, less mechanical wear, and improved process control**. Facilities that implement soft starters like the RB3 often see immediate benefits, such as fewer nuisance electrical trips, gentler machine operation, and even reduced maintenance costs on motors, gearboxes, and other components due to the elimination of start/stop shock. Real-world cases have shown significant improvements (e.g. 60% lower startup current and 40% maintenance cost reductions in certain applications) when transitioning from conventional starting methods to soft starters [48] [49].

Moreover, the RB3's advanced features – event logging, communications, customizable I/O – mean it is ready for integration into modern automated systems and IIoT (Industrial Internet of Things) setups. As industry moves toward smarter motor control centers, devices like the RB3 ensure that even across hundreds of motors, engineers can **monitor and manage each one's performance in detail**. Benshaw, with decades of experience in solid-state control, has designed the RB3 to meet the rigorous demands of industrial environments (hence their motto "Rapid. Rugged. Global." for these starters).

In summary, the Benshaw RB3 softstarter is an excellent choice for customers looking to **solve motor starting problems** such as electrical surges or mechanical stress, without the complexity or expense of a full variable frequency drive when constant speed is acceptable. It stands out through its **combination of heavy-duty capability and intelligent control**. By applying an RB3, users can expect smoother operations, improved protection of their assets, and a wealth of diagnostic information – all of which translate to higher productivity and peace of mind in day-to-day operations. Whether it's a **200 HP pump** in a municipal water plant, a **400 HP fan** in a steel mill, or a **50 HP compressor** in an HVAC system, the Benshaw RB3 series provides the soft start solution to get these motors up and running reliably and efficiently.

References:

1. Benshaw Inc. – *RB3 Open Chassis Soft Starter* (Product Page) – Official product overview describing RB3 series features (MX3 technology, integral bypass, protection functions, etc.) and motor protection capabilities.
2. Benshaw Low Voltage Soft Starters Catalog (July 2025 Edition) – *RB2/RB3 Series* – Manufacturer catalog with specifications, rating tables (HP ranges at various voltages), feature comparisons between Benshaw soft starter series, and standards compliance (UL/CSA listings, etc.).
3. Benshaw RediStart MX3 User Manual (RB3, RC3, RX3E Models) – Detailed technical manual (2006) for the MX3-based soft starters, including descriptions of start duties (350%/500%/600% for 30s), control features (Cyclo slow-speed mode, timers), and parameter settings.
4. Trimantec – *Benshaw RB3-1-S-040A-11C Soft Starter* Product Page – Example distributor page listing a specific RB3 model; confirms key specs (208–575 V, 350%/500%/600% duty ratings, 3-year warranty) and reiterates Benshaw's description of the MX3 features and integral bypass.
5. Schneider Electric Blog – *"VFDs and Soft Starters: Is There Really a Competition?"* – Industry blog post (2019) with a succinct explanation of what a soft starter is. Notably states that soft starters "provide a gentle ramp up to full speed" and "reduce mechanical stress on the motor and shaft, as well as electrodynamic stresses on the network," which underscores the fundamental benefits of soft starters.
6. Hoyer Motors – *Understanding the Role of Current Limit in Soft Starters* – Technical article (2024) that discusses how soft starters reduce mechanical stress and increase motor lifespan. Useful for general context on soft start benefits and how features like current limiting work to prevent high startup peaks.
7. Allied Market Research – *How Soft Starters Are Revolutionizing Motor Control* – Market insights blog (2024) covering the growing use of soft starters in various industries. It highlights applications like HVAC fans and water treatment pumps, noting that soft starters prevent water hammer and reduce maintenance costs in such systems.
8. ABB Softstarters – *Technical Catalog and Case Studies* – ABB publication showcasing their PSTX soft starter features and real-world success stories. Includes data points like "starting currents reduced by 60%" (HVAC case) and "maintenance costs reduced by 40%" (industrial case) after implementing soft starters, illustrating tangible benefits also achievable with Benshaw RB3.
9. Benshaw Inc. – *Ball Mill Control* (Motor Control Insights Blog) – Benshaw article (2024) describing the use of Benshaw soft starters in controlling a large ball mill. Emphasizes how the soft starter with a synchronous motor excitation package reduced mechanical stresses and eliminated high inrush currents for a 1250 HP mill motor, demonstrating the capability of Benshaw's soft start solutions in heavy-duty applications.

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