Model S3460BR

Battery Ride-Thru System

Customer Reference Manual

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Bonitron, Inc.
Nashville, TN

An industry leader in providing solutions for AC drives.

ABOUT BONITRON

Bonitron designs and manufactures quality industrial electronics that improve the reliability of processes and variable frequency drives worldwide. With products in numerous industries, and an educated and experienced team of engineers, Bonitron has seen thousands of products engineered since 1962 and welcomes custom applications.

With engineering, production, and testing all in the same facility, Bonitron is able to ensure its products are of the utmost quality and ready to be applied to your application.

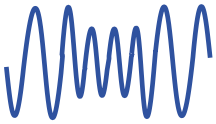
The Bonitron engineering team has the background and expertise necessary to design, develop, and manufacture the quality industrial electronic systems demanded in today's market. A strong academic background supported by continuing education is complemented by many years of hands-on field experience. A clear advantage Bonitron has over many competitors is combined on-site engineering labs and manufacturing facilities, which allows the engineering team to have immediate access to testing and manufacturing. This not only saves time during prototype development, but also is essential to providing only the highest quality products.

The sales and marketing teams work closely with engineering to provide up-to-date information and provide remarkable customer support to make sure you receive the best solution for your application. Thanks to this combination of quality products and superior customer support, Bonitron has products installed in critical applications worldwide.

AC Drive Options

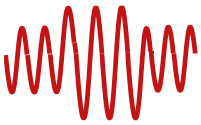
In 1975, Bonitron began working with AC inverter drive specialists at synthetic fiber plants to develop speed control systems that could be interfaced with their plant process computers. Ever since, Bonitron has developed AC drive options that solve application issues associated with modern AC variable frequency drives and aid in reducing drive faults. Below is a sampling of Bonitron's current product offering.

World Class Products



Undervoltage Solutions

Uninterruptible Power for Drives
(DC Bus Ride-Thru)
Voltage Regulators
Chargers and Dischargers
Energy Storage



Overvoltage Solutions

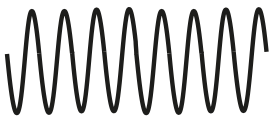
Braking Transistors
Braking Resistors
Transistor/Resistor Combo
Line Regeneration
Dynamic Braking for Servo Drives

Common Bus Solutions

Single Phase Power Supplies
3-Phase Power Supplies
Common Bus Diodes

Portable Maintenance Solutions

Capacitor Formers
Capacitor Testers



Power Quality Solutions

12 and 18 Pulse Kits

Green Solutions

Line Regeneration

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1. INTRODUCTION

1.1. WHO SHOULD USE

This manual is intended for use by anyone who is responsible for integrating, installing, maintaining, troubleshooting, or using this equipment with any AC drive system.

Please keep this manual for future reference.

1.2. PURPOSE AND SCOPE

This manual is a user's guide for the model S3460BR battery ride-thru systems. It will provide the user with the necessary information to successfully install, integrate, and use these in a variable frequency AC drive system.

In the event of any conflict between this document and any publication and/or documentation related to the AC drive system, the latter shall have precedence.

1.3. MANUAL VERSION

Additional data and clarifications were made in Section 7 in Rev 01a.

The Part description in Section 2 was updated in Rev 02a.

Figure 2-1 and Table 2-3 were updated in Rev 02b.

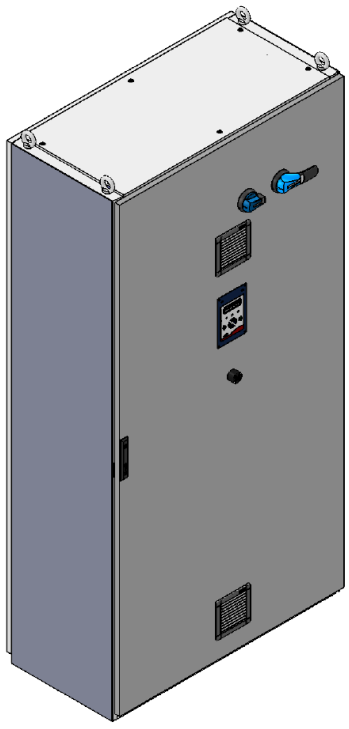
Added DD5 digital display option in rev 02c.

Added figure 3-3 showing internal enable wiring in rev 02d.

Updated drawings and text to reflect new M5628 charger in rev 02e.

Updated Figure 1-1, 6-1, and 6-2, and footer on final page in rev 02f.

Figure 1-1: S3460BR Ride–Thru System



1.4. SYMBOL CONVENTIONS USED IN THIS MANUAL AND ON EQUIPMENT

	Earth Ground or Protective Earth
	AC Voltage
	DC Voltage
 **DANGER!**	DANGER: Electrical hazard - Identifies a statement that indicates a shock or electrocution hazard that must be avoided.
 **DANGER!**	DANGER: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
 **CAUTION!**	CAUTION: Identifies information about practices or circumstances that can lead to property damage, or economic loss. Attentions help you identify a potential hazard, avoid a hazard, and recognize the consequences.
 **CAUTION!**	CAUTION: Heat or burn hazard - Identifies a statement regarding heat production or a burn hazard that should be avoided.

2. PRODUCT DESCRIPTION

Bonitron S3460BR series of DC bus ride-thru systems provide protection from long term line voltage outages for variable frequency drives (VFDs) that use a fixed rectifier and DC bus. Providing power for outage times up to 15 minutes allows sufficient time for generator start up and transfer to auxiliary power.

Industries with continuous processes can suffer huge losses from equipment downtime, loss of production, or damaged product when VFDs trip on undervoltage conditions. While many drives claim to have ride through capability such as auto restart or kinetic buffering, none can control the motor during a complete loss of power. Typical UPS solutions are designed to increase drive availability but are connected in series which decreases overall drive system reliability. All Bonitron ride-thru products connect in parallel with the drive, thus increasing system availability and reliability.

Bonitron S3460BR systems provide sufficient ride through capability to handle these outages by storing energy in battery banks and releasing it back into the drives DC bus when needed. This allows the drive to "ride-thru" these events while maintaining motor speed and torque without experiencing drive shutdown.

A complete S3460BR battery backup system includes a charger, booster, and an interface module. Batteries are sold separately.

ADVANTAGES

- Reliability
- Parallel connection to AC system
- Works with almost any fixed bus, variable frequency, PWM drive
- Only 2-3 parallel connections
- Can use existing AC feed wiring and breakers
- Instant response
- Bumpless transfer
- Easy commissioning

2.1. RELATED PRODUCTS AND DOCUMENTS

2.1.1. PRODUCTS

M3460 SERIES RIDE-THRU MODULES

Voltage regulators used for sag or outage protection of higher power systems.

M5628 BATTERY AND ULTRACAPACITOR CHARGERS

Chargers for high voltage storage strings.

S3460SR SERIES SAG RIDE

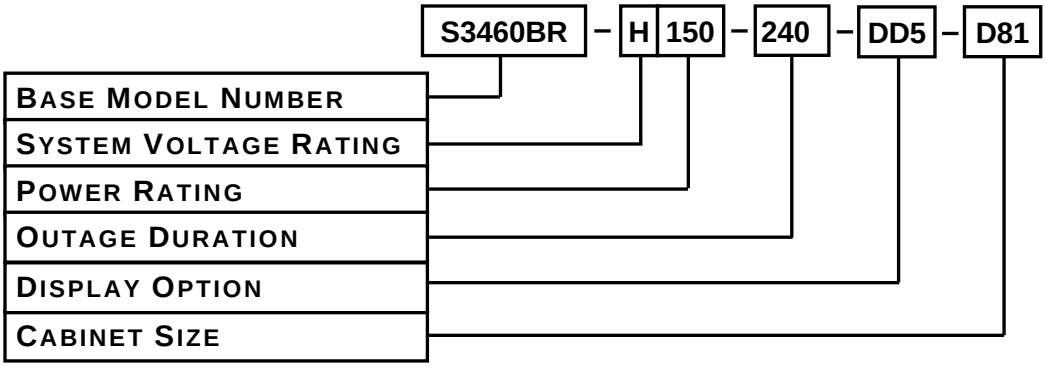
An enclosed system for 50%-line sag for 2 seconds or a single phase full outage for up to 2 seconds.

2.1.2. DOCUMENTS

Please refer to the M3460 manual.
Please refer to the KIT 3660DD5 manual when the system is equipped with the DD5 digital interface option.
These manuals are available at www.bonitron.com or by contacting Bonitron.

2.2. PART NUMBER BREAKDOWN

Figure 2-1: Example of Part Number Breakdown



BASE MODEL NUMBER

The base model number for all enclosed battery ride-thru systems is S3460BR**.**

SYSTEM VOLTAGE RATING

The system voltage rating indicates the nominal AC / DC voltage levels of the AC drive system the ride-thru is intended to support. A code letter indicates the system voltage.

Table 2-1: System Voltage Rating Codes

RATING CODE	VOLTAGES (NOMINAL AC LINE / DC BUS)
L	230VAC / 320VDC
E	380 - 415VAC / 540 - 585VDC
H	460VAC / 640VDC

POWER RATING (KW)

The power rating indicates the maximum power in kilowatts that can safely be handled by the S3460BR and is represented by a 3-digit value based on the nominal DC system voltage rating and the maximum output current rating of the S3460BR. For instance, the code **150** indicates a 150kW S3460BR.

OUTAGE DURATION

The outage duration indicates the amount of time (in seconds) the M3460B module can hold the DC bus at the threshold level while loaded to the rated current. This duration is directly represented by a 3-digit value. For example, 240 in this position represents 240 seconds (4 minutes) of outage duration.)

DISPLAY OPTION

The display option indicates which display is mounted on the front of the enclosure. The displays show the S3460BR operating status and permit a system test function to be performed. The DD5 digital display has many more features than the DP10 analog display, including outage and fault logging. Please refer to the KIT 3660DD5 manual for a full description of features.

Table 2-2: Display Panel Configurations

DISPLAY MODEL	LOCAL INDICATORS	VOLTMETER	AMMETER	TOTAL COUNTER	RESETTABLE COUNTER	ACTIVITY LOGGING	LOCAL TEST INITIATION
DD5	✓	✓	✓	✓	✓	✓	✓
DP10	✓				✓		✓

CABINET SIZE

The model S3460BR battery regulator is available in various cabinet sizes. Size is dependent on the boost module's kW rating. The cabinet size is indicated by a code as shown in Table 2-3. All dimensions are in inches, see Section 6.4 for complete dimensional outline details.

Table 2-3: Cabinet Codes

CABINET CODE	VOLTAGE RATING	POWER RATING	DESCRIPTION
D81	L	25 kW, 38KW, 50KW	71" H x 32" W x 20" D UL Type-12 floor mount enclosure
	E	43 kW, 65KW, 87KW	
	H	50 kW, 75KW, 100KW	
D82	L	75 kW, 100 kW	79" H x 40" W x 20" D UL Type-12 floor mount enclosure
	E	130 kW, 175 kW	
	H	150 kW, 200 kW	

2.3. GENERAL SPECIFICATIONS

Table 2-4: S3460BR General Specifications

PARAMETER	SPECIFICATION	
System AC Voltage	230,380-415, 460 VAC	
Battery Bank Voltage Range	320 – 540 VDC	
Output DC Voltage	285 – 585 VDC	
DC Bus Current Rating (Max)	85 – 340 ADC	
Power Rating (Range)	25 – 200 kW	
Output Duration	1 – 15 minutes	
Operating Temperature	0 - 40º C	
Storage Temperature	-20 - 65º C	
Status Output Signals	Opto FET 350V, 120mA	
Humidity	Below 90% non-condensing	
Atmosphere	Free of corrosive gas and conductive dust	
Logic I/O	Inputs 24VDC • OV / UV Reset • Charge Enable • Boost Enable	Outputs 20 - 28VDC • Battery Status • Charge Status • System Status1 • System Status 2 • Disconnect Switch Status

2.4. General Precautions and Safety Warnings

DANGER!

- HIGH VOLTAGES MAY BE PRESENT!
- NEVER ATTEMPT TO OPERATE THIS PRODUCT WITH THE ENCLOSURE COVER REMOVED!
- NEVER ATTEMPT TO SERVICE THIS PRODUCT WITHOUT FIRST DISCONNECTING POWER TO AND FROM THE UNIT.
- ALWAYS ALLOW ADEQUATE TIME FOR RESIDUAL VOLTAGES TO DRAIN BEFORE REMOVING THE ENCLOSURE COVER.
- **FAILURE TO HEED THESE WARNINGS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH!**

CAUTION!

- CERTAIN COMPONENTS WITHIN THIS PRODUCT MAY GENERATE HIGH AMBIENT TEMPERATURES DURING OPERATION.
- ALWAYS ALLOW AMPLE TIME FOR THE UNIT TO COOL BEFORE ATTEMPTING SERVICE ON THIS PRODUCT.
- BEFORE ATTEMPTING INSTALLATION OR REMOVAL OF THIS PRODUCT, BE SURE TO REVIEW ALL DRIVE AND/OR RESISTIVE LOAD DOCUMENTATION FOR PERTINENT SAFETY PRECAUTIONS.
- INSTALLATION AND/OR REMOVAL OF THIS PRODUCT SHOULD ONLY BE ACCOMPLISHED BY A QUALIFIED ELECTRICIAN IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE OR EQUIVALENT REGULATIONS.
- THIS PRODUCT DOES NOT PROVIDE MOTOR OVERLOAD PROTECTION.

ANY QUESTIONS AS TO APPLICATION, INSTALLATION, OR SERVICE SAFETY SHOULD BE DIRECTED TO THE EQUIPMENT SUPPLIER.

3. INSTALLATION INSTRUCTIONS

DANGER!

Installation and/or removal of this product should only be performed by a qualified electrician in accordance with National Electrical Code or local codes and regulations.

Proper installation of the S3460BR battery ride-thru should be accomplished following the steps outlined below. Be sure to refer to the AC drive instruction manual as these steps are performed. Please direct all installation inquiries that may arise during the installation and startup of this product to the equipment supplier or system integrator.

3.1. ENVIRONMENT

The maximum operating temperature of the ride-thru system should not exceed 40°C.

3.2. UNPACKING

Upon receipt of this product, please verify that the product received matches the product that was ordered and that there is no obvious physical damage to the unit. If the wrong product was received or the product is damaged in any way, please contact the supplier from which the product was purchased.

3.3. MOUNTING

1. Move the cabinet to the desired installation site.
2. Remove the hardware securing the cabinet to its pallet.
3. Using a crane or hoist connected to the cabinet's lifting eyes, remove the cabinet from the pallet, and set it in the desired location.
    - Secure the S3460BR cabinet in place. Cabinets may be anchored to the floor as necessary.
    - The system may come with separate cabinets, and the battery cabinet may be quite heavy compared to the booster cabinet.

3.4. WIRING AND CUSTOMER CONNECTIONS

Review this entire Section before attempting to wire the S3460BR.

3.4.1. POWER WIRING

DANGER!

THE M3460 CAN HAVE MULTIPLE POWER SOURCES, INCLUDING THE MAIN AC INPUT, ENERGY STORAGE SYSTEMS AND THE DC CONNECTION TO THE VFD.

ENSURE THAT ALL SOURCES ARE DISCONNECTED AND LOCKED OUT BEFORE ATTEMPTING SERVICE OR INSTALLATION.

FAILURE TO HEED THESE WARNINGS MAY RESULT IN SERIOUS INJURY OR DEATH!

This section provides information pertaining to the field wiring connections of the S3460BR ride-thru cabinet system. Actual connection points and terminal numbers of the AC drive system will be found in the documentation provided with that drive system.

Be sure to review all pertinent AC drive system documentation before proceeding.

3.4.1.1. POWER CONNECTIONS

AC LINE (L1, L2, L3) CONNECTIONS

During operation, the load on the AC line is used for charging and maintaining the battery storage modules.

See table 3-1 for AC line wiring specifications.

DC BUS (+ -) CONNECTIONS

The S3460BR must have a DC bus connection directly to the DC bus filter capacitors within the drives. Connections cannot be made through the braking terminals or with precharge resistors or DC link chokes between the output of the S3460BR and the DC bus capacitors in the drive. Consult the manufacturer's documentation or contact Bonitron for further assistance.

Make sure the polarity is correct for these connections, as failure to do so can cause severe damage to the system.

GROUNDING REQUIREMENTS

Cabinet should be earth grounded to the stud in upper right corner of the backplate. See Table 3-1 for wire size.

Battery Bank Wiring

Battery bank wiring should be sized to carry the full load current of the DC input at full load. See Table 3-1 for wire size.

The battery bank should be disabled by removing the center link of the battery string before wiring. This will not allow the battery bank to discharge if there is a wiring fault or short while these connections are being made.

Table 3-1: Power Field Wiring Connections for Cabinets

TERMINAL TYPE	FUNCTION	ELECTRICAL SPECIFICATIONS	MIN WIRE AWG	MAX WIRE AWG	TORQUE LB-IN
Disconnect Switch (L1, L2, L3)	AC Line Input	600 VAC	12 AWG	8 AWG	50 lb-in
Disconnect Switch DC(+), DC(–)	DC Output	600 VAC	4 AWG	3 / 0	50 lb-in
Battery Bank (+), (–)	DC Input	1000 VDC / 600A max	3/8" Ring Lug	3/8" Ring Lug	150 lb-in
GND	Ground	-	12 AWG	2 AWG	75 lb-in

Use copper wiring rated for 75°C for all connections.

3.4.1.2. CONTROL INTERFACE AND I/O WIRING

The control interface and I/O Wiring are from the M3460 ride-thru module. Please see the M3460 manual for further information on these outputs. If you want the system to be enabled with no external inputs, you will need to place a jumper from TB-1 to TB-2 and TB-4. You will also need to place a jumper from TB-6 to TB-7.
See Figure 3-3 for terminal locations.

Table 3-2: User I/O Terminal Connections for Cabinets

TERMINAL	FUNCTION
TB – 1	Courtesy + 24V
TB – 2	Charger ENABLE
TB – 3	Charger Equalize (EQ)
TB – 4	Ride-Thru ENABLE
TB – 5	Ride-Thru TEST
TB – 6	Input COM
TB – 7	Courtesy COM
TB – 8	Fault 1
TB – 9	Fault 2
TB – 10	Ride-Thru Active (RTA)
TB – 11	Output COM
TB – 12	Storage Undervoltage (NO)
TB – 13	Storage Undervoltage COM

Figure 3-1: Power Connections

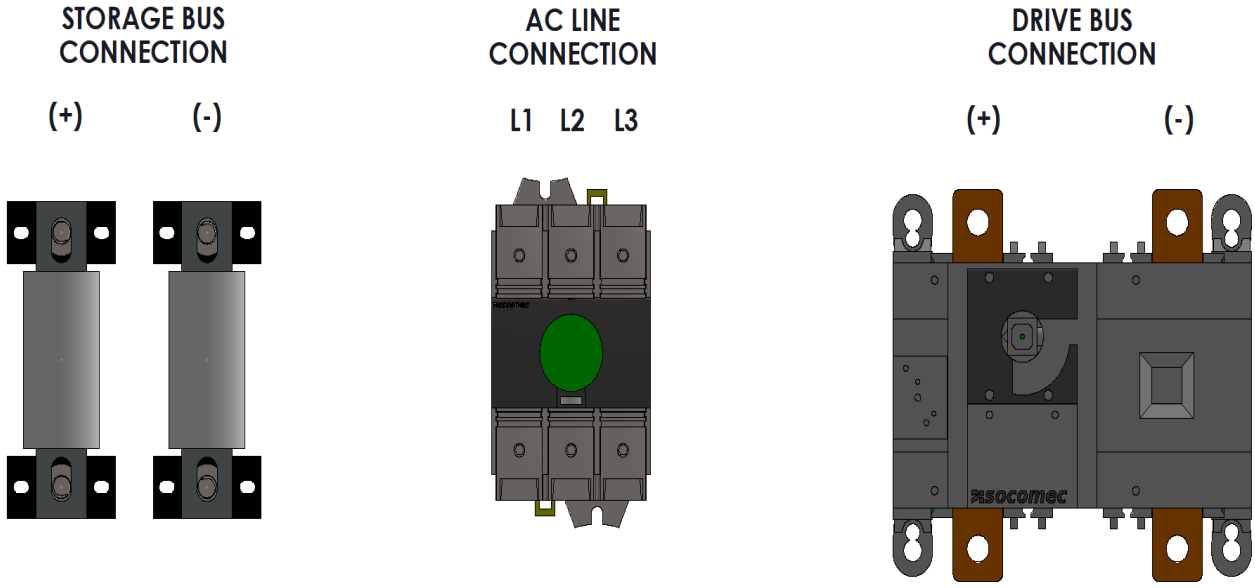
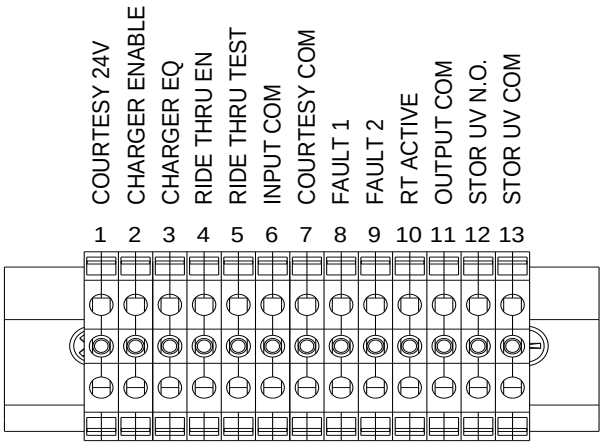


Figure 3-2: User I/O Connections Detail



I/O CONNECTIONS

Figure 3-3: User I/O Jumper Placement for internal Enable

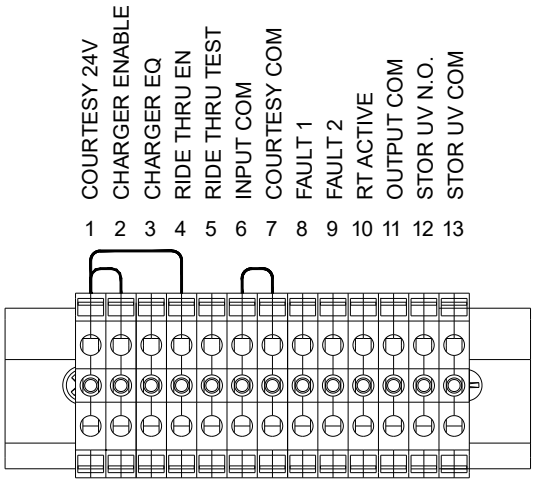


Figure 3-4: User I/O Connections with DD5 Interface Module

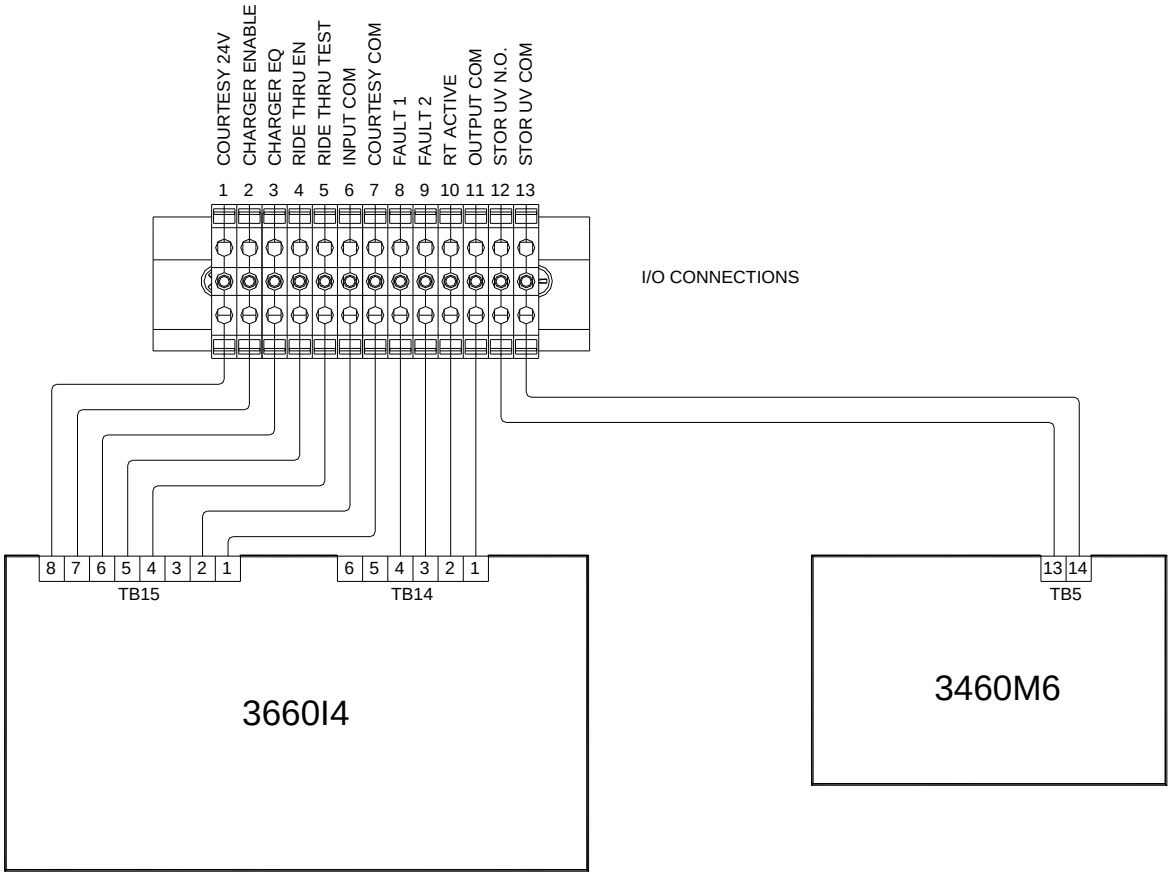


Figure 3-6: M3460B Typical Configuration with Energy Storage

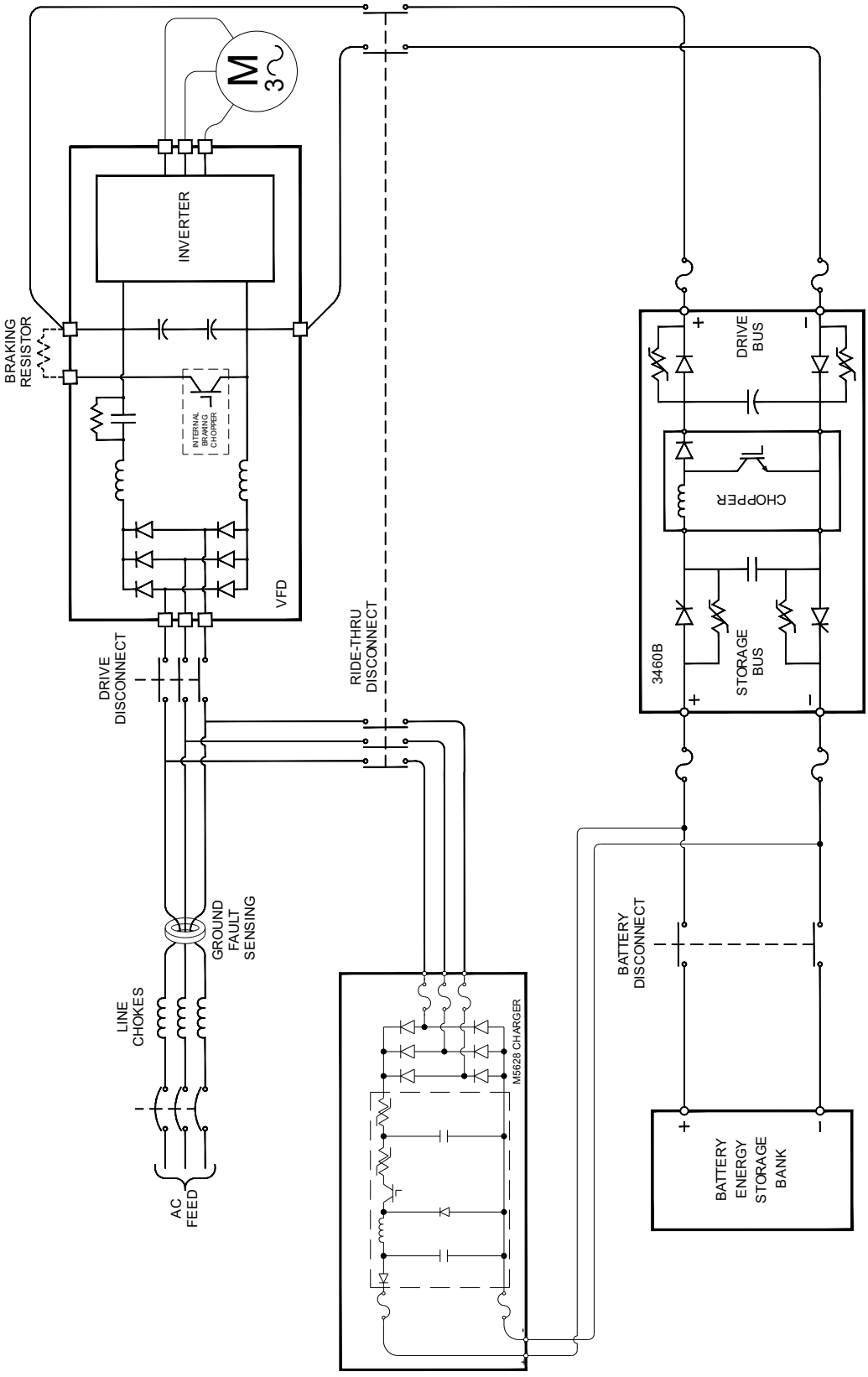
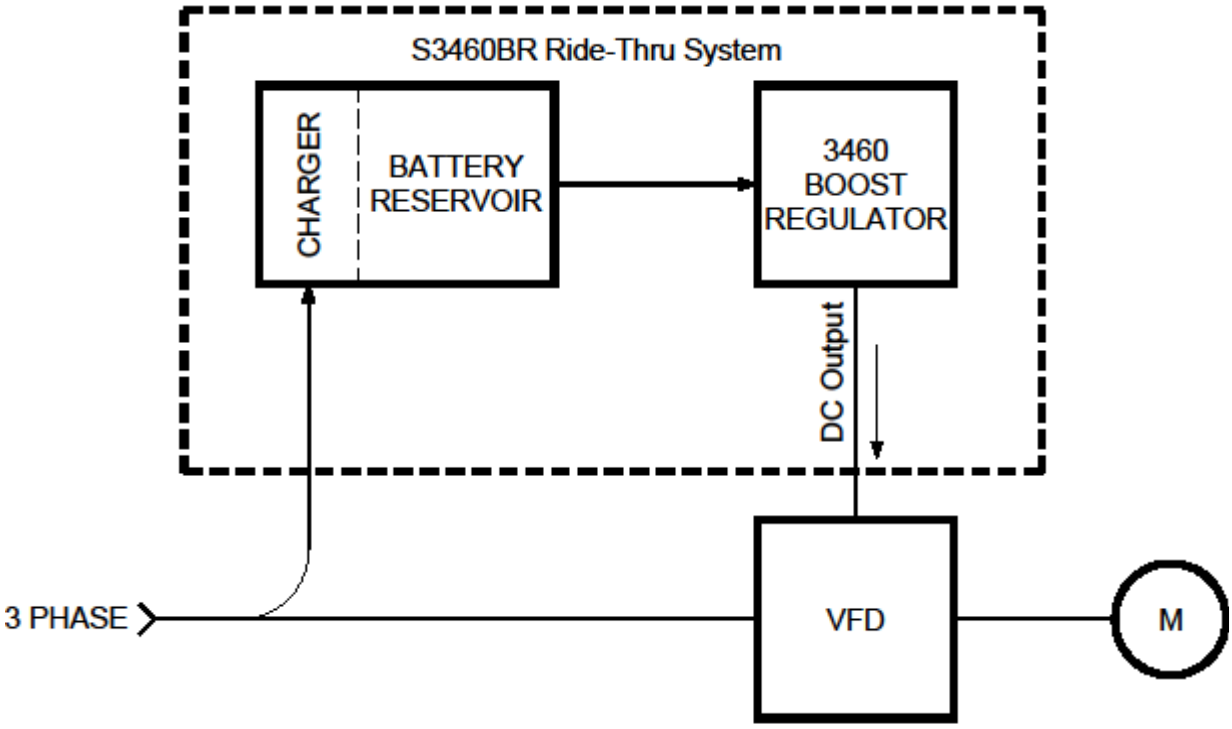


Figure 3-7: Ride-Thru System Configuration



ABOVE 50KW, 10 SECOND - 60 MINUTE, 100% OUTAGE PROTECTION
USING DC BOOSTER WITH BATTERY RESERVOIR

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4. OPERATION

4.1. FUNCTIONAL DESCRIPTION

The S3460BR ride-thru system monitors the DC bus of the attached variable frequency drive (VFD) and provides power in a voltage controlled, current limited supply directly to the filter capacitor section of the drive above the inverter stage. During a power quality event, such as a sag or power outage, the internal DC bus of the VFD drops. When this level meets the DC bus threshold voltage of the S3460BR, power is delivered through blocking diodes to hold up the voltage in the VFD bus.

Energy is stored in a battery bank and the boost module regulates and boosts the output voltage to the drive at a constant voltage.

In standby mode, or when the incoming AC power is normal, the system recharges the battery bank and holds the energy storage at a constant level. Once the battery bank is charged, the standby energy consumption is minimal.

4.2. STARTUP PROCEDURE

4.2.1. PRE-POWER CHECKS

1. Ensure the Bonitron ride-thru has been properly installed as per the instructions in Section 3 of this manual.
2. Check the polarity of the DC bus connection to the VFD at the disconnect. It is critical that this is correct.
3. Initialize the battery cabinet. High voltage battery cabinets are shipped with links missing. This prevents the battery bank from discharging during shipment if there is an accident or short.
4. Verify that the battery disconnect or breaker switch is OFF
5. Re-connect battery bank link as instructed by battery bank documentation package provided by the battery bank manufacturer.
6. Measure the battery string voltage. This should be above the nominal battery string voltage.
7. Turn on the battery system with the breaker inside the battery cabinet.
8. The ride-thru DC bus threshold must be coordinated with the undervoltage trip setting of the VFD. If the threshold is too close to the nominal bus, the ride-thru may supply power to the drive continuously and overheat. If the threshold is too close to the undervoltage trip level of the VFD, the system may not "ride-thru", and under voltage trips will still occur. Most VFDs have an undervoltage trip point of -15% of the nominal voltage level.

   Bonitron sets all Ride-Thru systems to boost at -10% of the nominal voltage level, for example, 460 VAC system will hold the DC bus to 585 VDC.
9. Power up the attached drive system. This should be done according to the procedure for the VFD. Ensure that the associated VFD is working properly prior to connecting to the ride-thru system.
10. Turn on the cabinet disconnect and observe the display status.
11. Verify that the energy storage bank is fully charged.
12. Remove the AC power from the fully loaded drive system simulating an outage event.

- The DC bus voltage should drop and hold at the Threshold Voltage level.
- Ride-Thru Active indicator turns ON.
- DC input will drop as the batteries discharge.
- Motor speed should remain constant.

4.3. SHUTDOWN PROCEDURE

1. Remove the enable signal to the M3460 booster module.
2. Turn off the AC input using the main disconnects. This will disconnect incoming AC power and the output DC power to the VFD.
3. Turn off the battery disconnect switch within the battery cabinet. This will remove the backup energy storage from the main booster cabinet.
4. Allow 5 minutes for the residual voltage in the booster cabinet to drain before opening the cabinet.

5. MAINTENANCE AND TROUBLESHOOTING

Repairs or modifications to this equipment are to be performed by Bonitron approved personnel only. Any repair or modification to this equipment by personnel not approved by Bonitron will void any warranty remaining on this unit.

5.1. FIELD TEST PROCEDURE

The Bonitron S3460BR ride-thru system is designed to be low maintenance. However, the connected energy storage battery bank will degrade over time and should be periodically checked. Bonitron recommends a yearly test of the system in order to ensure the electronics package is operating properly, and the storage bank has proper capacity. The following steps can be taken to ensure reliability that the system is still able to ride-thru an outage event.

Each Bonitron ride-thru should be tested under load during initial start up to verify the functionality of the test circuit and that the test does not negatively affect the process. However, Bonitron recommends that if the process is critical, the test cycle be initiated only during a scheduled shutdown.

1. Ensure the S3460BR has been properly installed.
2. Ensure the AC line input, drive bus, and battery bank are all installed properly to the cabinet disconnect.
3. Apply AC power to the drive and ensure it is working properly without faults, **THE DRIVE MUST BE ON BEFORE APPLYING POWER TO THE RIDE-THRU**.
4. Turn on the cabinet disconnect and observe the display status. The status should display charging and ride-thru standby. If there are faults on the system, turn off power and check the KIT 3660DD5 and the M3460 manuals for further troubleshooting details.
5. Enable the S3460BR with either the internal enable input or external PLC input.
6. Load the VFD as much as is practical for testing.
7. Initiate the test mode with the display panel to confirm that the booster is working properly.
   The DC bus should rise for about 100 VDC above the normal DC bus level.
8. Verify energy storage bank charge by removing AC power to the drive simulating an outage event.
   - The DC bus voltage should drop to the threshold voltage level.
   - Ride-Thru Active indicator turns ON.
   - DC bus voltage should hold at the threshold voltage level.
   - The drive should continue to run normally.
   - Motor speed should remain constant.
   - The system should only be allowed to run for a maximum of 4 minutes.
   - Re-apply the AC power to the inverter input.

   This completes the maintenance procedure and the S3460BR and drive system should now be ready to be put into service.

5.2. TROUBLESHOOTING

Table 5-1: Troubleshooting Guide

SYMPTOM	ACTION
No LEDs	▪ Check incoming power ▪ Check power supply 3460D5 for all voltages – replace if incorrect ▪ Check 24V RUN command
No +15 or -15 LEDs	▪ Check power supply 3460D5 for all voltages – replace if incorrect ▪ If OK, then replace 3460C1 control PCB
No RTR	▪ Check for RUN command ▪ Check stage fuses – look for blown fuse LED on 3460C1 ▪ Check 3460M6 interface ▪ IF OK replace 3460C1 control PCB
No PCC	▪ Check DC bus level – if not OK check pre-charge circuits or bus caps ▪ Check for RUN command ▪ Check stage fuses – look for blown fuse LED on 3460C1 ▪ Check 3460M6 interface ▪ IF OK replace 3460C1 control PCB
Voltage Fault	▪ Check input fuses ▪ Check 3460X4 phase loss monitor ▪ Check 3460M6 interface
RTA always ON	▪ Check DC bus levels on both sides of diodes ▪ Check for overheated pre-charge circuit ▪ Too much activity can cause stage fuse failures, overheating and draining of the battery ▪ Check threshold level, if changed over time adjust level or replace 3460C1
RTA never ON	▪ Check RUN command ▪ Initiate test cycle or remove power ▪ Watch and listen for signs of activity • Check RTA contact and LEDs • Ticking sound when active ▪ Check power quality data to confirm sag events should have caused activity to occur ▪ If no activity is observed, then replace 3460C1

SYMPTOM	ACTION
Overtemp	▪ Check for constant current on the negative and positive DC bus links ▪ Check temp sensors ▪ On SCR heatsink ▪ On diode heatsinks ▪ On IGBT heatsinks ▪ On chokes (if used) ▪ Check pre-charge network for overheating – (cause of constant activity) ▪ If all OK replace 3460M6 interface PCB ▪ Check activity record–Too much activity causes overtemp
Blown Fuse LED ON	▪ Check stage fuses – LED on 3460F fuse PCB will be ON or Fuse Indicator will indicate blown fuse ▪ If all stage fuses are OK replace 3460C control PCB
Blown stage fuses	▪ Check for shorted IGBT ▪ Replace 3438C2 gate driver if IGBT is bad ▪ Check or replace stage choke current sensor ▪ Check or replace 3438S stage IGBT snubber ▪ Check activity record ▪ Too much activity causes fuse fatigue
TEST won't work	▪ Check DC bus level – too high causes no test ▪ Check blown fuse LED during test – if on check stage fuses ▪ Check test input to 3460C1 ▪ If OK replace 3460C1
Voltage fluctuates during TEST mode	▪ Check threshold and test boost level settings. Over-voltage shutdown can occur if settings are too high on 460V systems, causing an oscillation affect. ▪ Lower threshold level and retry ▪ Check for loss of feedback from DC bus to 3460C1
Stays in TEST mode	▪ Replace 3460C1
Precharge overheated	▪ Check DC bus ripple voltage. Too much ripple can cause PTCRs to overheat. ▪ Add parallel pre-charge PTCRs ▪ Change series pre-charge resistance ▪ Add fan to cool PTCRs ▪ Add isolated bias supply ▪ Precharge can only be done 3 consecutive times before overheating can occur

CAUTION!

REPAIRS OR MODIFICATIONS TO THIS EQUIPMENT ARE TO BE PERFORMED BY BONITRON APPROVED PERSONNEL ONLY. ANY REPAIR OR MODIFICATION TO THIS EQUIPMENT BY PERSONNEL NOT APPROVED BY BONITRON WILL VOID ANY WARRANTY REMAINING.

5.3. TECHNICAL HELP – BEFORE YOU CALL

If possible, please have the following information when calling for technical help:

- Exact model number of affected units
- Serial number of unit
- Name and model number of attached drives
- Name of original equipment supplier
- Brief description of the application
- The AC line to line voltage on all 3 phases
- The battery bank voltage
- The DC Bus voltage
- KVA rating of power source
- Source configuration Wye/Delta and grounding

This information will help us support you much more quickly. Please contact us at (615) 244-2825 or through www.bonitron.com

6. ENGINEERING DATA

6.1. RATINGS

See M3460 manual for the ride-thru module rating.

6.2. WATT LOSS (INACTIVE POWER CONSUMPTION)

See M3460 and M5628 manuals for watt loss information.

6.3. RATING CHARTS

Fuses are installed by Bonitron on the M3460 ride-thru module. Fusing information is available in M3460 manual.

Table 6-1: Model Specifications

DC BUS CURRENT[1]	BACKPLATE SIZE	BOOST CIRCUIT CONFIGURATION	BOOST CIRCUIT FUSE RATING	RECOMMENDED FUSE RATING[2]	
				BATTERY INPUT	DC BUS OUTPUT
43A	R10	1-Stage	100A	70A	50A
85A	R10	1-Stage	125A	125A	100A
127A	R9	2-Stage	125A	200A	150A
170A	R9	2-Stage	125A	250A	175A
255A	R2	4-Stage	125A	400A	300A
340A	R2	4-Stage	125A	500A	350A

[1] Please note that the DC bus current ratings listed above indicate the TOTAL DC bus current that can safely be handled by the battery regulator ride-thru unit. While each DC output from the ride-thru is capable of handling this load, for ride-thru units with multiple outputs, the combined load of all outputs must not exceed this rating.

[2] Fuses recommended for use with S3460BR ride-thru systems should be Gould-Shawmut A70QS series, Buss FWP series, or equivalent semiconductor fuses.

Table 6-2: Battery Bank Typical Values

SYSTEM AC VOLTAGE	230 VAC	380 VAC	400 VAC	415 VAC	433 VAC	460 VAC
Battery Qty	20	34	35	36	38	40
Nominal DC Voltage	240 VDC	408 VDC	420 VDC	432 VDC	456 VDC	480 VDC
Full or Float Voltage	270 VDC	459 VDC	473 VDC	486 VDC	513 VDC	540 VDC
Equalize Voltage	277 VDC	470 VDC	484 VDC	498 VDC	526 VDC	554 VDC
Storage Over Voltage	230VDC	475VDC	489VDC	503VDC	531VDC	559VDC
Discharged Voltage	200 VDC	340 VDC	350 VDC	360 VDC	380 VDC	400 VDC

Table 6-3: Voltage Specifications Table

AC Input Voltage	Tolerance	Output DC Bus Nominal Voltage	Threshold Voltage	Low DC Bus Voltage Fault
230 VAC	± 10%	320 VDC	285 VDC (adjustable from 220-300)	250 VDC
380 VAC	± 10%	530 VDC	485 VDC (adjustable from 440-540)	450 VDC
460 VAC	± 10%	640 VDC	585 VDC (adjustable from 525-625)	550 VDC

Table 6-4: Factory Setpoints for Threshold and Test Boost Voltages

System AC Voltage	Minimum Input Voltage (IUV)	Threshold	Low DC Bus (OUV)	Test Boost
230 VAC	200 VDC	285 VDC	260 VDC	+50 VDC
380 VAC	340 VDC	485 VDC	460 VDC	+75 VDC
460 VAC	400 VDC	585 VDC	560 VDC	+100 VDC

6.4. DIMENSIONS AND MECHANICAL DRAWINGS

Figure 6-1: D81 Cabinet Dimensional Outline

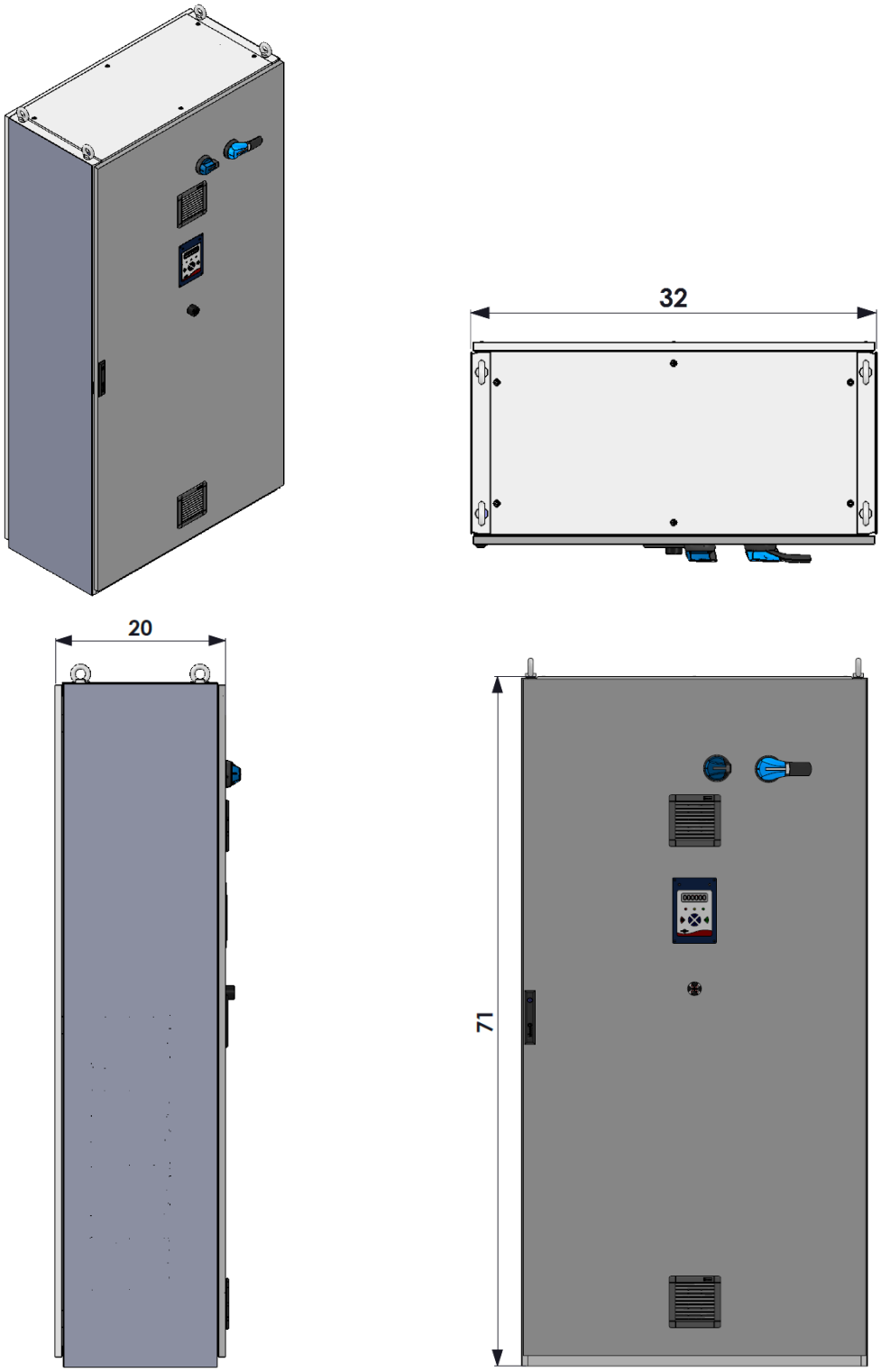
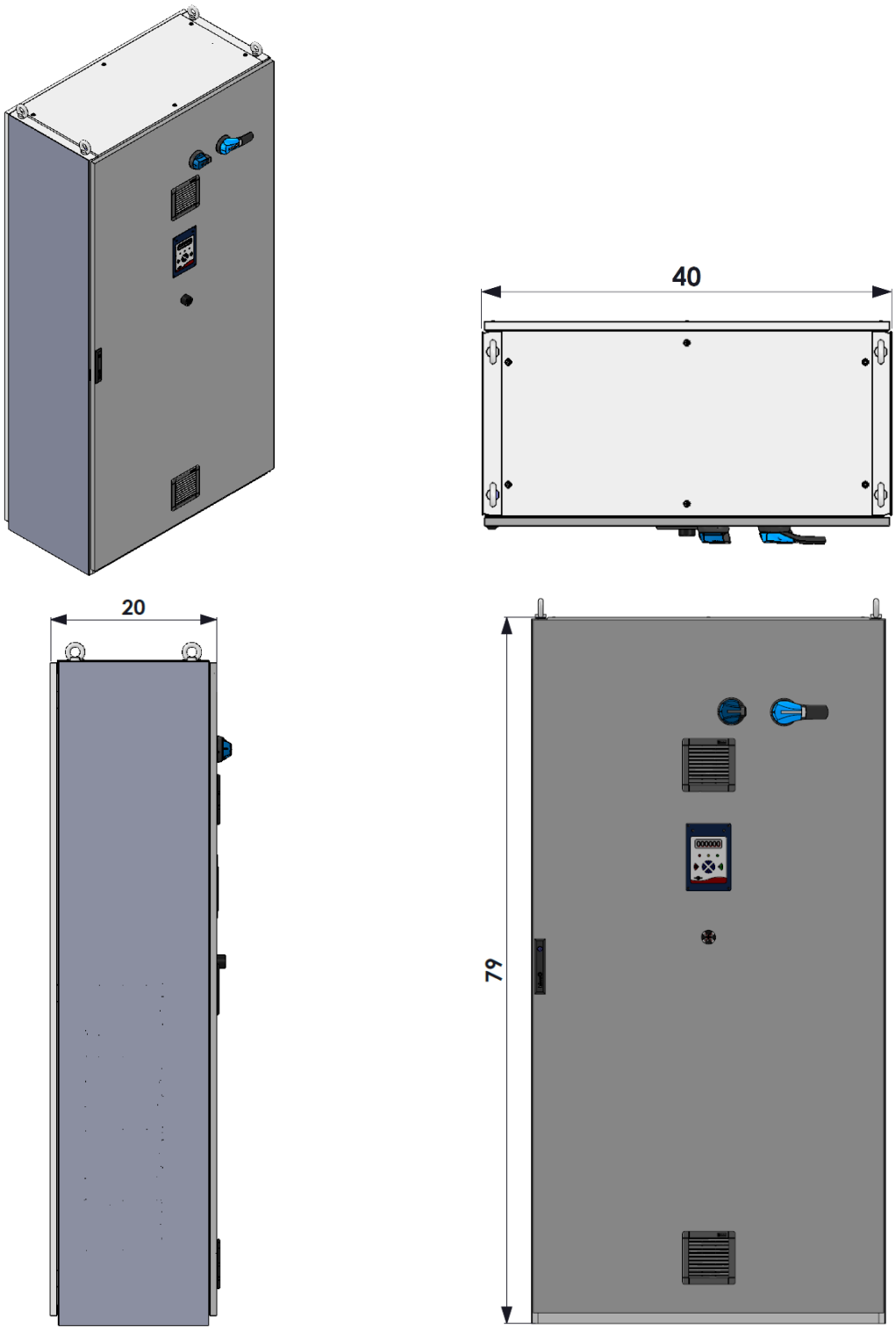


Figure 6-2: D82 Cabinet Dimensional Outline



NOTES

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