



Solutions for AC Drives

KIT 3660DD5

Monitoring System for Bonitron Ride-Thru Systems

Customer Reference Manual

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.

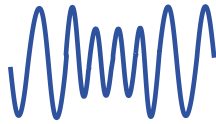
The Bonitron engineering team has the background and expertise necessary to design, develop, and manufacture the quality industrial electronic systems demanded in today's market. A strong academic background supported by continuing education is complemented by many years of hands-on field experience. 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

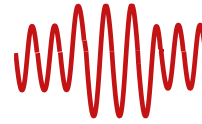
In 1975, Bonitron began working with AC inverter drive specialists at synthetic fiber plants to develop speed control systems that could be interfaced with their plant process computers. Ever since, Bonitron has developed AC drive options that solve application issues associated with modern AC variable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

WORLD CLASS PRODUCTS



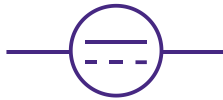
Undervoltage Solutions

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



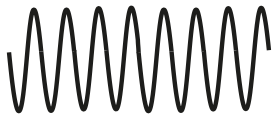
Common Bus Solutions

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

This manual is intended for use by anyone who is responsible for integrating, installing, maintaining, troubleshooting, or using this equipment with any M3460 or M3534 ride-thru system.

Please keep this manual for future reference.

1.2. PURPOSE AND SCOPE

This manual is a user's guide for the KIT 3660DD5 ride-thru monitoring system. It will provide the user with the necessary information to successfully install, integrate, and use the KIT 3660DD5.

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

The initial release for this part is Rev 00a.








Updated table 3-3, 3-4, and 3-5 in Rev 00b.

Updated figures 3-1 to 3-10, tables 3-1 and 6-1, and added CE and UL certification information in Rev 01a.

Figure 1-1: KIT 3660DD5



1.4. SYMBOL CONVENTIONS USED IN THIS MANUAL AND ON EQUIPMENT

| | |
|---|---|
|  | Earth Ground or Protective Earth |
|  | AC Voltage |
|  | DC Voltage |
|  | DANGER: Electrical Hazard - Identifies a statement that indicates a shock or electrocution hazard that must be avoided. |
|  | DANGER: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. |
|  | 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: Heat or burn hazard - Identifies a statement regarding heat production or a burn hazard that should be avoided. |

2. PRODUCT DESCRIPTION

The KIT 3660DD5 gives the users real time information about ride-thru system functions and can be used to monitor and present power quality issues that can cause process disturbances and production loss. A history of power quality events is stored in persistent memory for later analysis, showing the effectiveness of the ride-thru system.

The KIT 3660DD5 ride-thru monitoring system is designed to monitor and display information about the Bonitron ride-thru system, such as the present values of the system voltages and currents, or any fault conditions that may exist. The KIT 3660DD5 also provides the ability to easily test the ride-thru system to ensure full protection from any power quality events. The monitoring system saves the thirty most recent power quality events, recording information such as the time of the event, the duration of the event, and the voltage levels during the event. Information is presented to the user via a four-line, eighty-character display and a set of three LEDs. This, combined with a simple, intuitive, menu-based interface, makes the system usable with minimal training. Isolated customer connections are available for remote controlling of enable/disable signals, equalize and test functions, as well as fault notification.

2.1. RELATED PRODUCTS

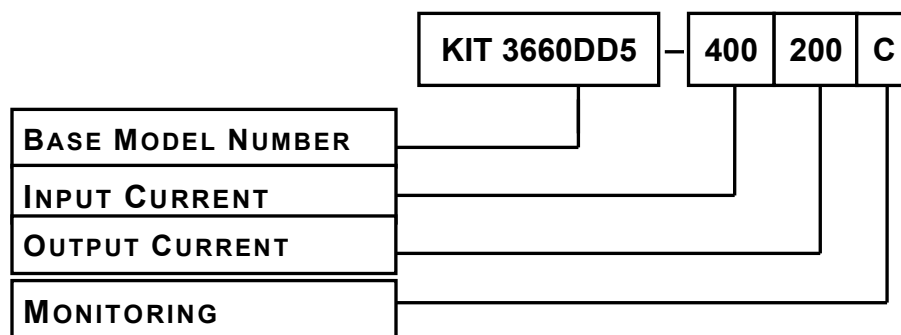
This product is designed for use with the M3460 and M3534 ride-thru systems. Contact your distributor for more information.

2.1.1. OTHER REFERENCE MANUALS

Please refer to the appropriate M3460 or M3534 ride-thru voltage regulator manual for more information on the ride-thru system.

2.2. PART NUMBER BREAKDOWN

Figure 2-1: Example of Part Number Breakdown



BASE MODEL NUMBER

The base model number is KIT 3660DD5.

INPUT SENSOR

A three-digit code indicates the nominal current rating of the sensors provided for the input and output of the ride-thru system. See Table 2-1.

OUTPUT SENSOR

A three-digit code indicates the nominal current rating of the sensors provided for the input and output of the ride-thru system. See Table 2-1.

Table 2-1: Nominal Current Sensor Ratings

| SENSOR CODE | INPUT CURRENT RATING | OUTPUT CURRENT RATING |
|-------------|----------------------|-----------------------|
| 050 | 50 A | 50 A |
| 100 | 100 A | 100 A |
| 200 | 200 A | 200 A |
| 400 | 400 A | 400 A |
| 600 | 600 A | n/a |
| 1K0 | 1000 A | n/a |

MONITORING

If the ride-thru system to be monitored has a charger, then place a “**C**” in this position. A third current sensor will be included for the charger current to the storage device. Ride-thru systems with chargers are designed to handle full outages.

If the charge current is NOT to be monitored, place an “**X**” in this position. This is for systems only with two current sensors. Ride-thru systems without chargers are designed to handle line sags.

Table 2-2: Nominal Current Sensor Ratings

| MONITORING CODE | NUMBER OF CURRENT SENSORS INCLUDED | TYPE OF RIDE-THRU SYSTEM |
|-----------------|------------------------------------|--------------------------|
| C | 3 | Outage |
| X | 2 | Sag |

2.3. GENERAL SPECIFICATIONS**Table 2-2: General Specifications**

| PARAMETER | SPECIFICATION |
|-----------------------|---|
| Power | 24 VDC $\pm 10\%$, 500 mA |
| System AC Voltages | CAT III 600 VAC 3~ |
| System DC Voltages | CAT III 1000 VDC --- |
| System Output Current | 0-425 A |
| System Input Current | 0-850 A |
| CE and UL Approval | See Section 6.3 for Certifications |
| Operating Temperature | 0 to +40°C |
| Storage Temperature | -20 to +65°C |
| Humidity | Below 90 % non condensing |
| Atmosphere | Free of corrosive gas and conductive dust |

2.4. GENERAL PRECAUTIONS AND SAFETY WARNINGS



DANGER!

- **HIGH VOLTAGES MAY BE PRESENT!**
- **FAILURE TO HEED THESE WARNINGS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH!**



CAUTION!

- **NO USER-SERVICEABLE PARTS ARE CONTAINED WITHIN THIS PRODUCT.**
- **INOPERABLE UNITS SHOULD BE REPLACED OR RETURNED FOR EVALUATION AND/OR REPAIR BY BONITRON.**
- **BEFORE ATTEMPTING INSTALLATION OR REMOVAL OF THIS PRODUCT, BE SURE TO REVIEW DOCUMENTATION OF ALL CONNECTED DEVICES FOR PERTINENT SAFETY PRECAUTIONS.**
- **INSTALLATION AND/OR REMOVAL OF THIS PRODUCT SHOULD ONLY BE DONE BY A QUALIFIED ELECTRICIAN IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE OR EQUIVALENT REGULATIONS.**

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

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3. INSTALLATION INSTRUCTIONS

The KIT 3660DD5 is intended to be part of a larger variable frequency drive system and may require different hardware for interconnection based on the installation. An appropriate enclosure may need to be provided to protect personnel from contact and the system from damage. The type of enclosure should also protect the equipment from the installation environment.

Please read this manual completely before designing the drive system or enclosure layout to ensure all required elements are included.

3.1. ENVIRONMENT

The maximum ambient operating temperature of the ride-thru system should not exceed 40°C. Temperatures above this can cause overheating during operation.

Non-condensing filtered air may be required to cool the system if other components cause excessive heat buildup in the enclosure.

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

Mounting dimensions can be found in Section 6.

The display panel should be mounted in a location that would allow easy access for the user. The interface module should be mounted near the display panel so that the wire length between them is minimal.

When selecting the location to mount the current sensors, take into consideration that a 12-foot wiring harness comes attached with each current sensor.

Current sensor placement:

- Around the positive wire from the Ride-Thru DC output.
- Around the positive wire of the Storage bus output.
- Around the positive wire of the charger DC output.



Each current sensor must be mounted so the positive current flow matches the direction of the arrow on the current sensor.

3.4. WIRING AND USER CONNECTIONS

Review this entire section before attempting to wire the KIT 3660DD5.



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

3.4.1. CONTROL INTERFACE WIRING

Control wiring allows the KIT 3660DD5 to remotely control and monitor the ride-thru system. The system control wiring connects the KIT 3660DD5 to internal components of the ride-thru system. The user control wiring connects the KIT 3660DD5 to external components of the system.

Use copper conductors rated 75°C.

Table 3-1: 3660 Interface Board Power Wiring Specifications

| 3660 INTERFACE BOARD TERMINAL | FUNCTION | ELECTRICAL SPECIFICATIONS | WIRE AWG | TORQUE |
|-------------------------------|----------------------------|---------------------------|----------|------------|
| POWER TERMINAL SPECIFICATIONS | | | | |
| TB11 + | Control Power Input +24VDC | 24 VDC, 500 mA | 16 | 2.1 lb-in |
| TB11 - | Control Power Input -24VDC | | | |
| POWER INPUTS | | | | |
| TB2 - L1 | AC ϕ1 Input | 0-600 VAC | 16 - 6 | 15.5 lb-in |
| TB2 - L2 | AC ϕ2 Input | | | |
| TB2 - L3 | AC ϕ3 Input | | | |
| TB6 - 1 | Drive Bus Input + | 0-1000 VDC | 16 - 12 | 4.5 lb-in |
| TB6 - 2 | Unused | | | |
| TB6 - 3 | Unused | | | |
| TB6 - 4 | Drive Bus Input - | | | |
| TB8 - 1 | Storage Bus Input + | 0-1000 VDC | 16 - 12 | 4.5 lb-in |
| TB8 - 2 | Unused | | | |
| TB8 - 3 | Unused | | | |
| TB8 - 4 | Storage Bus Input - | | | |

Table 3-2: KIT 3660DD5 Current Sensor Wiring Specifications

| 3660 INTERFACE BOARD TERMINAL | FUNCTION | ELECTRICAL SPECIFICATIONS | WIRE AWG | TORQUE |
|--|------------------------------|------------------------------|-------------|-----------|
| CURRENT SENSOR INPUTS | | | | |
| TB5 - 1 | Charge Current Sensor + 15V | ± 15 VDC, 250 mA | 16 | 2.1 lb-in |
| TB5 - 2 | Charge Current Sensor - 15V | | | |
| TB5 - 3 | Charge Current Sensor Signal | | | |
| TB5 - 4 | Charge Current Sensor Common | | | |
| TB4 - 1 | Input Current Sensor + 15V | ± 15 VDC, 250 mA | 16 | 2.1 lb-in |
| TB4 - 2 | Input Current Sensor - 15V | | | |
| TB4 - 3 | Input Current Sensor Signal | | | |
| TB4 - 4 | Input Current Sensor Common | | | |
| TB1 - 1 | Output Current Sensor + 15V | ± 15 VDC, 250 mA | 16 | 2.1 lb-in |
| TB1 - 2 | Output Current Sensor - 15V | | | |
| TB1 - 3 | Output Current Sensor Signal | | | |
| TB1 - 4 | Output Current Sensor Common | | | |

Table 3-3: Internal System Control Wiring Specifications

| 3660 INTERFACE BOARD TERMINAL | FUNCTION | ELECTRICAL SPECIFICATIONS | WIRE AWG | TORQUE |
|--|--|------------------------------|-------------|-----------|
| INTERNAL INPUTS | | | | |
| TB9 - 1 | Ride-Thru Active (RTA) Input | 24 VDC, 25 mA | 16 | 2.1 lb-in |
| TB9 - 2 | Ride-Thru Ready (RTR) Input | | | |
| TB9 - 3 | Precharge Complete (PCC) Input | | | |
| TB9 - 4 | Ride-Thru Overtemp (RT OT) Input | | | |
| TB9 - 5 | Spare | | | |
| TB9 - 6 | Input Common | | | |
| TB7 - 1 | Charger Fault (CH FAULT) Input | 24 VDC, 25 mA | 16 | 2.1 lb-in |
| TB7 - 2 | Charger Active (CH ACTIVE) Input | | | |
| TB7 - 3 | Storage Imbalance (IMBALANCE) Input | | | |
| TB7 - 4 | Storage Overtemp (STOR OT) Input | | | |
| TB7 - 5 | Discharge Resistor Overtemp (DISCH OT) Input | | | |
| TB7 - 6 | Input Common | | | |
| INTERNAL OUTPUTS | | | | |
| TB3 - 1 | Output Common | 24 VDC, 120 mA | 16 | 2.1 lb-in |
| TB3 - 2 | Output Common | | | |
| TB3 - 3 | Spare | | | |
| TB3 - 4 | Discharger Enable (DISCH) Output | | | |
| TB3 - 5 | Charger Equalize (CH EQ) Output | | | |
| TB3 - 6 | Charger Enable (CH EN) Output | | | |
| TB3 - 7 | Ride-Thru Test (RT TEST) Output | | | |
| TB3 - 8 | Ride-Thru Enable (RT EN) Output | | | |

Table 3-4: User Control Wiring Specifications

| 3660 INTERFACE BOARD TERMINAL | FUNCTION | ELECTRICAL SPECIFICATIONS | WIRE AWG | TORQUE |
|--|-------------------------------------|------------------------------|-------------|-----------|
| USER INPUTS | | | | |
| TB15 - 1 | 24V Common | 24 VDC, 25 mA | 16 | 2.1 lb-in |
| TB15 - 2 | Input Common | | | |
| TB15 - 3 | Spare | | | |
| TB15- 4 | Ride-Thru Test (RT Test) Input | | | |
| TB15 - 5 | Ride-Thru Enable (RT EN) Input | | | |
| TB15 - 6 | Charger Equalize (CH EQ) Input | | | |
| TB15 - 7 | Charger Enable (CH EN) Input | | | |
| TB15 - 8 | Courtesy 24V | | | |
| USER OUTPUTS | | | | |
| TB14 - 1 | Output Common | 250 VDC, 120 mA | 16 | 2.1 lb-in |
| TB14 - 2 | Ride-Thru Active (RT ACTIVE) Output | | | |
| TB14 - 3 | Fault 2 (N.O.) Output | | | |
| TB14 - 4 | Fault 1 (N.O.) Output | | | |
| TB14 - 5 | Spare 1 (N.O.) | | | |
| TB14 - 6 | Spare 2 (N.O.) | | | |

Table 3-5: ASM 3660 Interface Board User Bypass Jumpers (J3)

| USER JUMPERS (J3) | FUNCTION | DEFAULT SETTING |
|-------------------|---|--------------------------------|
| RT BYPASS | Prevents the KIT 3660DD5 from disabling the Ride-Thru | Open |
| RT NORMAL | Allows the KIT 3660DD5 to disable the Ride-Thru | Closed |
| CH BYPASS | Prevents the KIT 3660DD5 from disabling the charger | Open (if charger is used) |
| CH NORMAL | Allows the KIT 3660DD5 to disable the Charger | Closed (if charger is used) |
| DISCH BYPASS | Not Used | n/a |
| DISCH NORMAL | Not Used | n/a |
| SPARE 1 | Not Used | n/a |
| SPARE 2 | Not Used | n/a |

Figure 3-1: Digital Display Interface I/O Locations

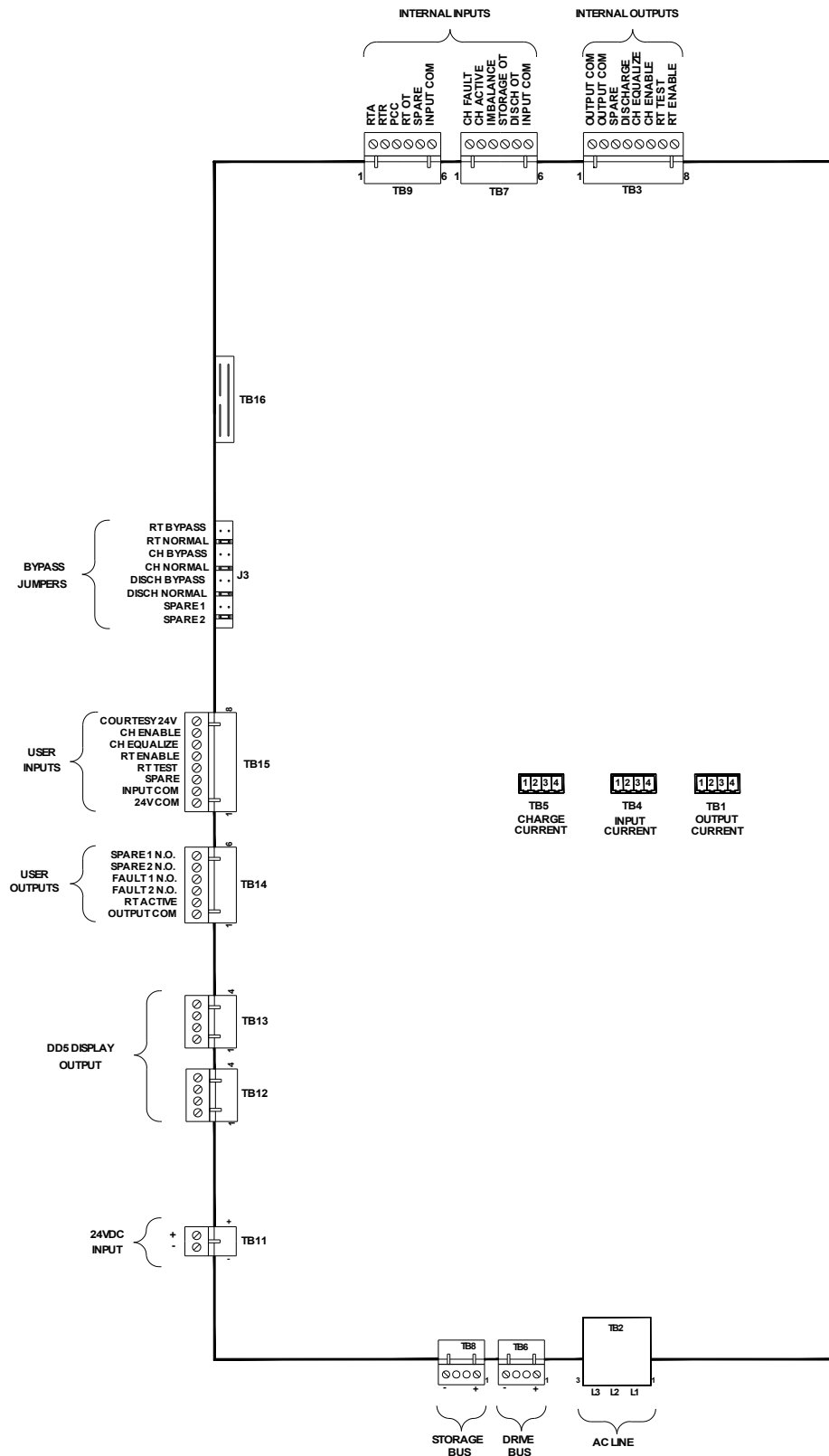


Figure 3-2: Digital Display DD5 wiring with Digital Display Interface

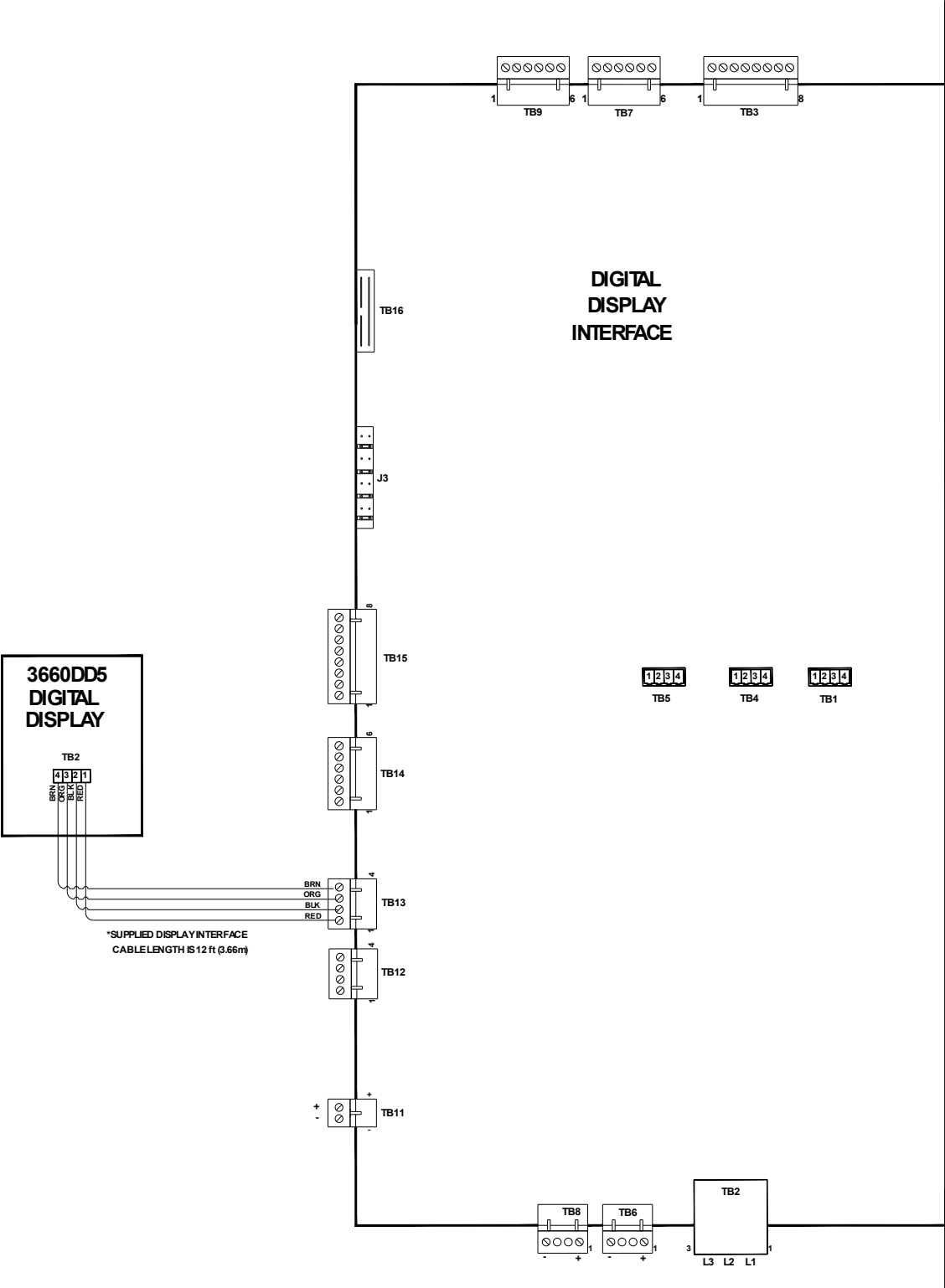


Figure 3-3: KIT 3660DD5 Current Sensor Wiring Detail

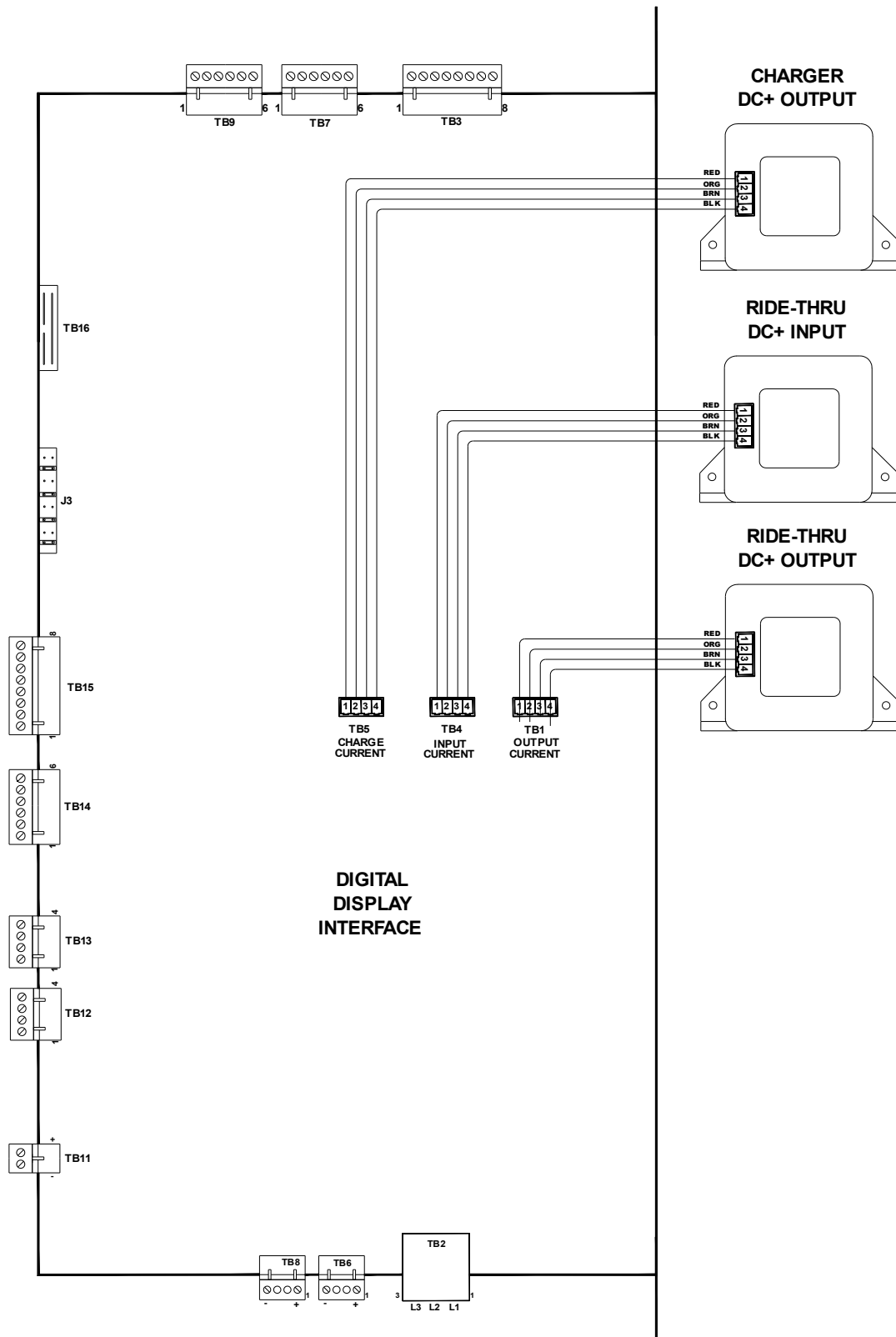


Figure 3-4: KIT 3660DD5 Current Sensor Wiring Example

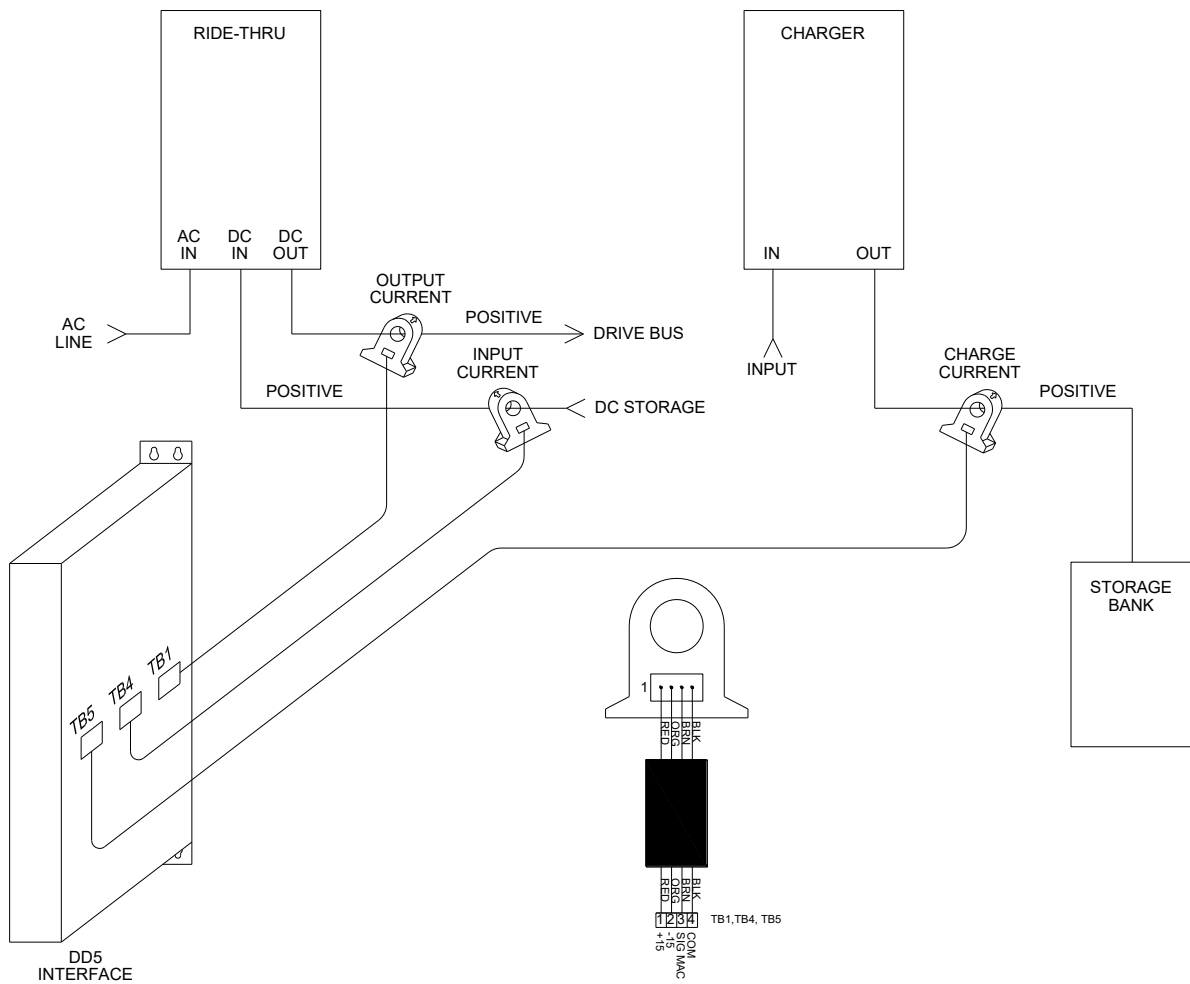




Figure 3-6: KIT 3660DD5 Wiring with M3460 and M3528

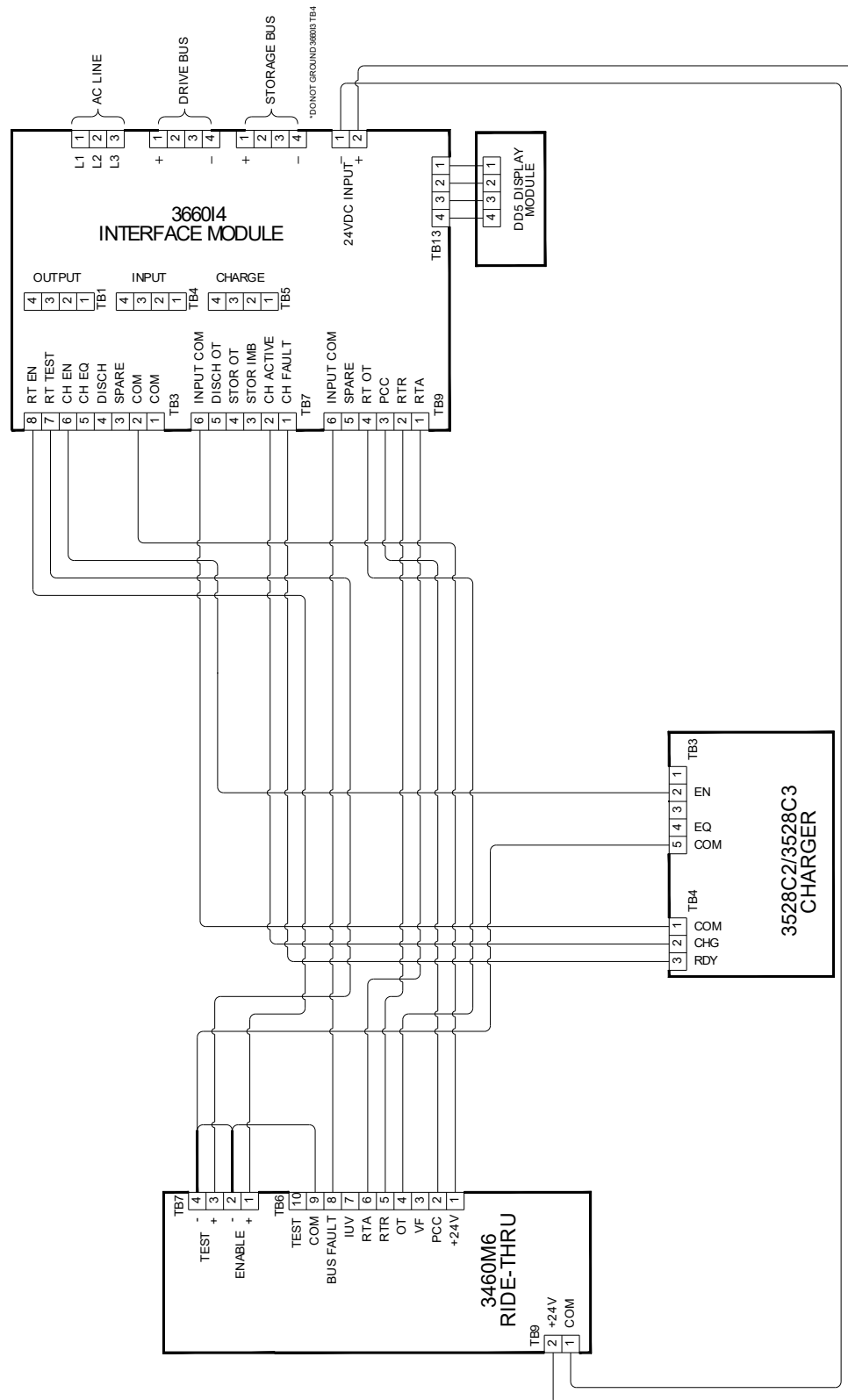


Figure 3-7: KIT 3660DD5 Wiring with M3460, M3528 and KIT 3628T

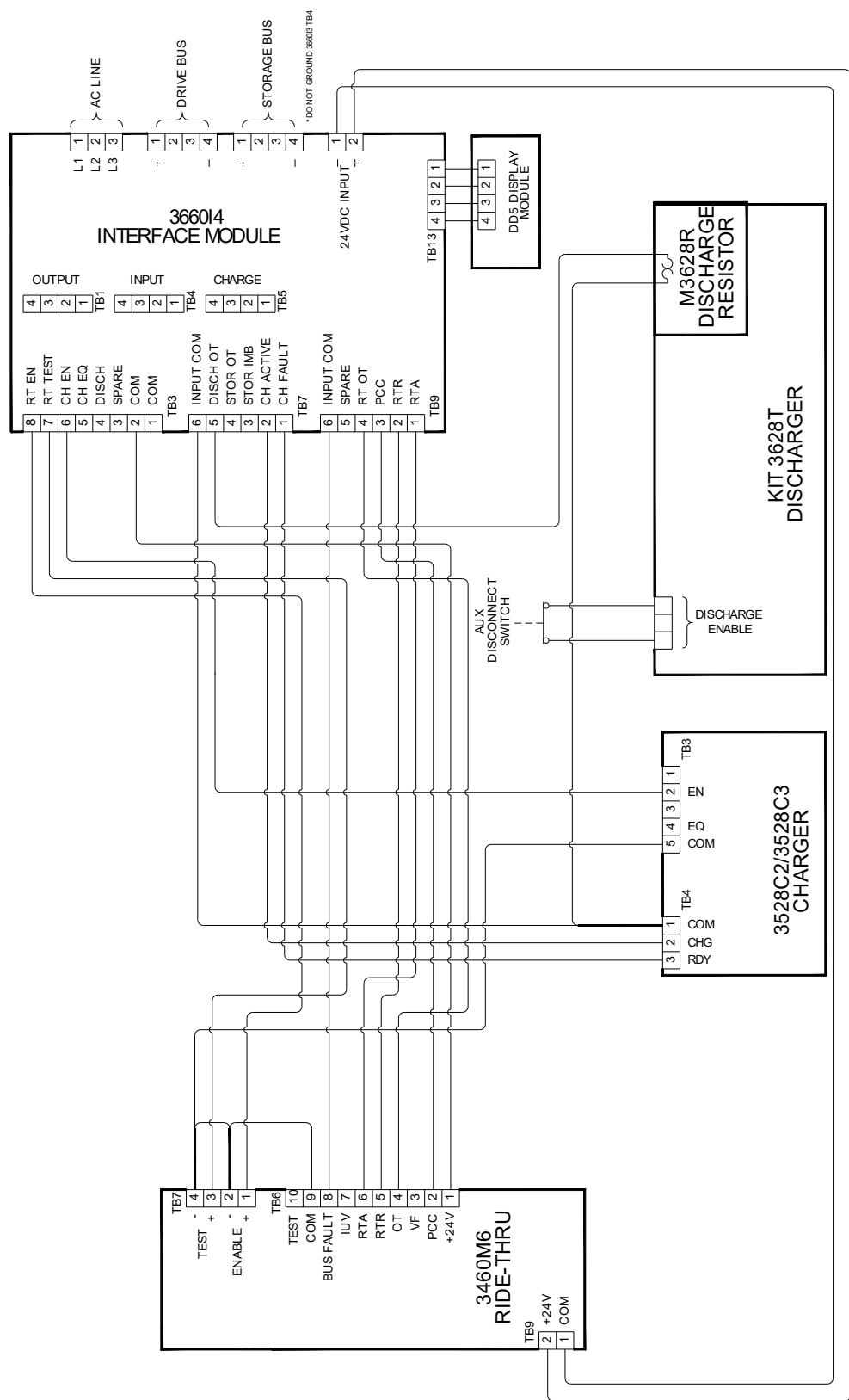


Figure 3-8: KIT 3660DD5 Wiring with M3534

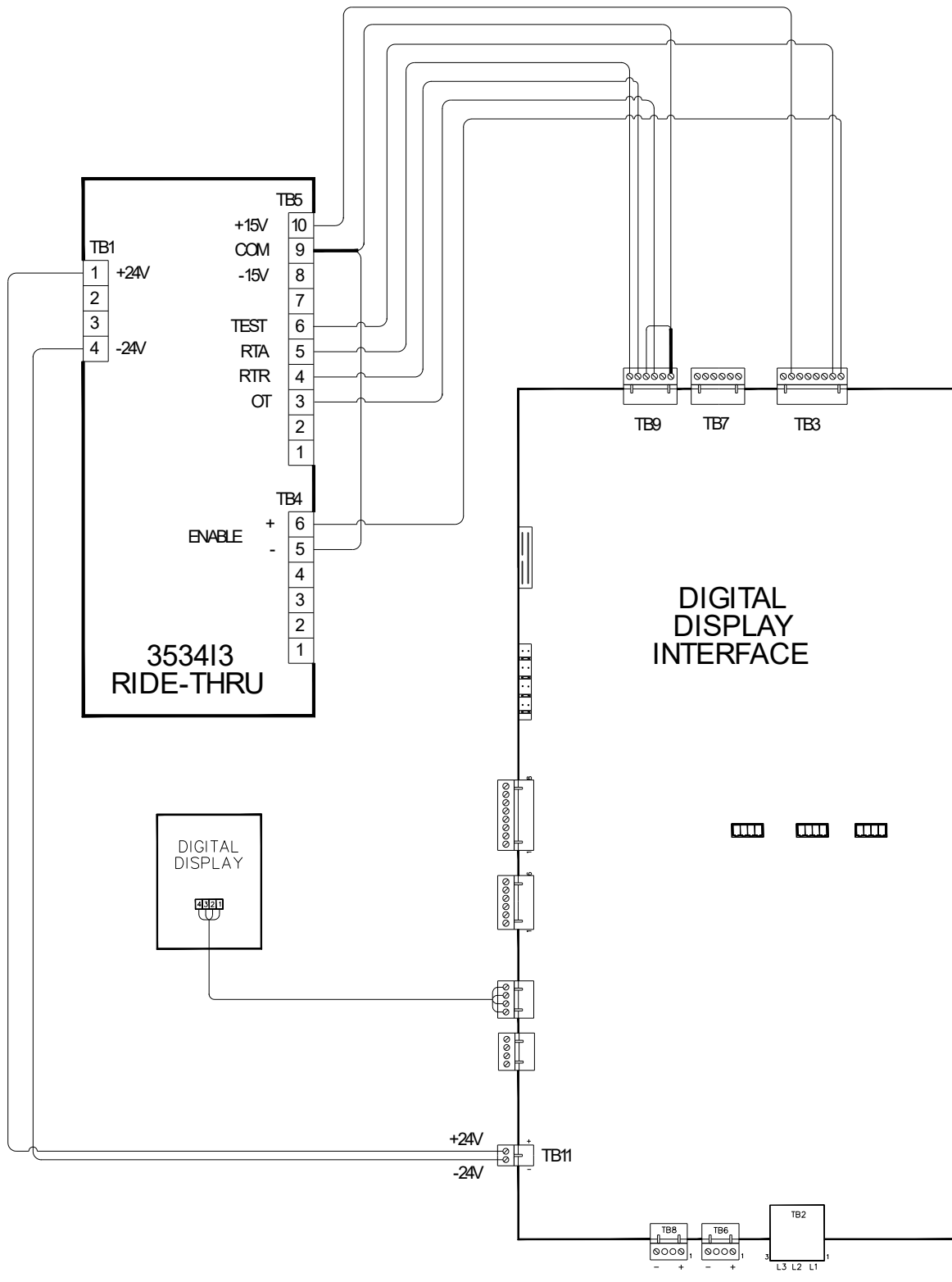


Figure 3-9: KIT 3660DD5 Wiring with M3534 and M3528

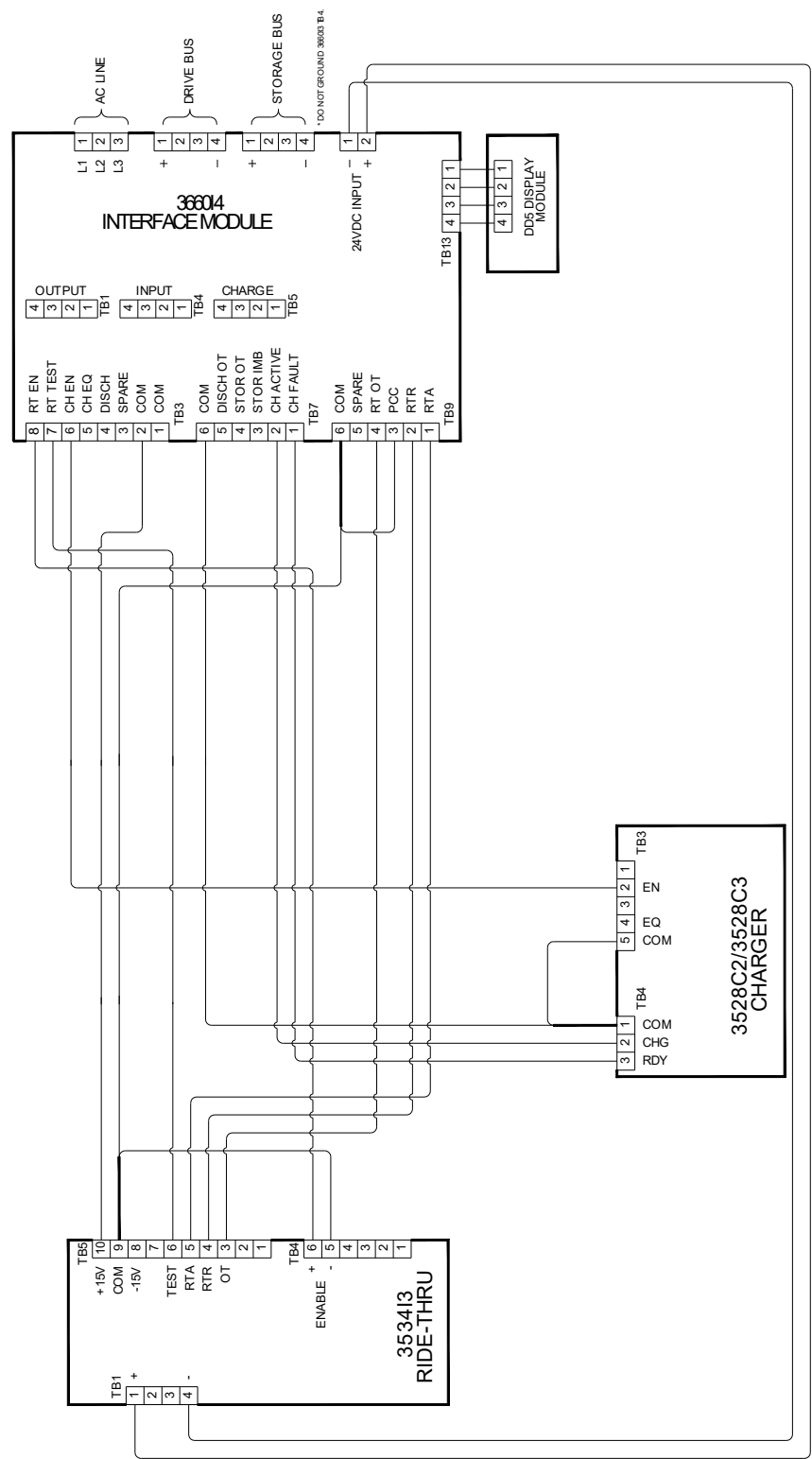
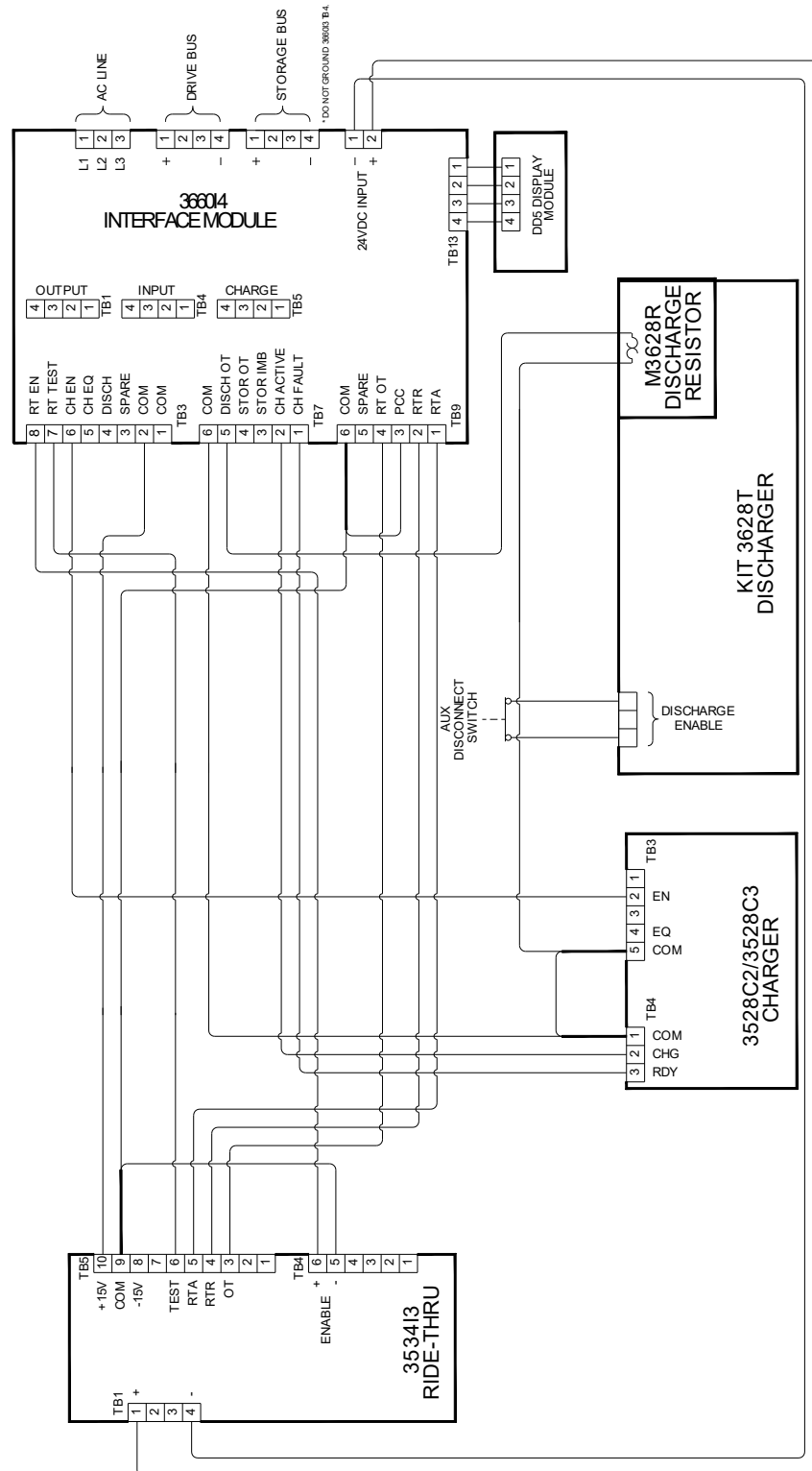


Figure 3-10: KIT 3660DD5 Wiring with M3534, M3528 and KIT 3628T



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4. OPERATION

4.1. FUNCTIONAL DESCRIPTION

The KIT 3660DD5 monitors the operation of the ride-thru system. Information is presented to the user via a 4x20 character LCD and a set of red, yellow, and green LEDs. User input is through six buttons on the face of the display panel; they are arranged in a standard up-down-left-right-enter-cancel configuration. The function of each button varies depending on the screen being shown on the LCD.

The KIT 3660DD5 performs several functions; the most basic of these is displaying the general system status. This includes the system voltages and currents, as well as the state of the internal components.

If the KIT 3660DD5 detects a system fault, the red status LED turns on, and the fault state is displayed on the LCD. If multiple faults are detected, the display scrolls through each fault automatically. The last 100 fault states are saved in persistent memory; these fault records contain the individual faults, along with the time it occurred. The records can be viewed from the front panel. Some faults may disable different components of the system until the fault is cleared. Faults may be cleared either by a key combination on the front panel, or by toggling the enable input to the appropriate component.

When a power quality event occurs, the yellow status LED turns on, and the display indicates that the ride-thru is active. The start time and initial AC and DC voltages are recorded in persistent memory, along with the duration and minimum voltages reached once the power quality event is over. While detailed records are saved for only the 30 most recent events, a running count is kept of the total number of events, cumulative event duration, and average event duration. These event records and statistics can be viewed and reset from the display. A separate lifetime event counter is present which is not user-resettable. A battery-backed real-time clock keeps the time of day, as set by the user, in order to track the time and duration of power quality events.

The KIT 3660DD5 allows the user to initiate a ride-thru test for preventative maintenance and to ensure proper ride-thru operation. The user may also initiate a charger equalize cycle of a fixed length, set from the display front panel.

4.2. DISPLAY INTERFACE

The KIT 3660DD5 is composed of two circuit boards, the 3660 interface board and the 3660 display board. The display board provides the user interface, and keeps time. The interface board accepts digital and analog signals from the ride-thru system and the user, and processes them before sending them to the display board via CANbus. The interface board provides an isolated power supply to the display board, as well as an isolated serial connection.

4.2.1. DISPLAY

The display is a four-line, eighty-character LCD. This display shows information about the present status of the ride-thru system, records of power quality events and faults, and menus allowing the user to select actions or access other screens.

4.2.2. LEDs

Red, yellow, and green LEDs indicate the status of the ride-thru.

- Red indicates a fault has occurred. The display will indicate the nature of this fault.
- Yellow indicates that the ride-thru or the charger is active.
- Green indicates that the display is receiving power from the ride-thru system.

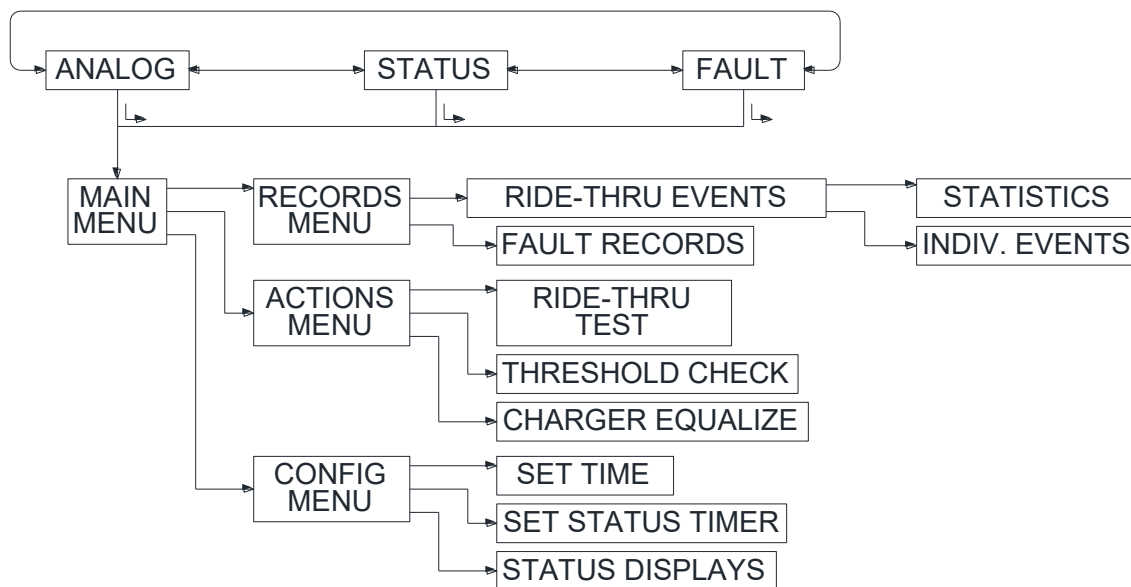
4.2.3. BUTTONS

The function of each button depends on the active screen. For menu screens, *enter* selects a menu option, while *cancel* moves back to the previous screen. *Up* and *down* move the menu cursor. On screens where numbers are input by the user, the *left* and *right* buttons move the cursor, while the *up* and *down* buttons change the selected digit. *Enter* stores the present value, while *cancel* undoes any changes. On some screens, certain buttons may have no function at all.

4.3. SCREENS & MENU NAVIGATION

Many screens are menus allowing access to other screens, or lists presenting a number of options. The presently selected item on the menu is indicated by a '>' character. This selection indicator is moved using the *up* and *down* buttons. If a line on the menu represents another screen, that screen may be accessed with the *enter* key. The *cancel* button will return the display to the previous screen.

Figure 4-1: Screen Menu Tree



4.3.1. STATUS SCREEN

Upon system start, after a set period of inactivity, or during certain events, the system transitions to the Status screen. The status screen displays the present ride-thru and charger state, and two system voltages or currents. The variables displayed will be those selected by the user in the Configuration menu. Each value is indicated by both a number and a bar graph.

Left: Analog screen

Right: Fault screen

Enter: Main menu

4.3.2. FAULT SCREEN

If a fault occurs, the red LED will turn on, and the display will transition to the Fault screen. If more than one fault is detected, the screen will scroll through all the faults at two-second intervals. Pressing *up* or *down* allows for faster manual scrolling through the faults. Pressing *left* and *right* simultaneously will clear any resettable faults.

Up: Show previous fault

Down: Show next fault

Left: Status screen

Right: Analog screen

Left & Right: Clear faults

Enter: Main menu

Cancel: Status screen

4.3.3. ANALOG SCREEN

This screen displays the present values of four of the eight system voltages and currents. One set shows storage voltage, storage current, output voltage, and output current; the other set shows the AC phase voltages and the charging current (not shown if charger is not connected). Which set is displayed can be changed by pressing *up* or *down*. Each value is indicated by both a number and a bar graph.

Up/Down: Switch analog set displayed

Left: Fault screen

Right: Status screen

Enter: Main menu

Cancel: Status screen

4.3.4. MAIN MENU

From this screen, the user may select viewing records, executing actions, or configuring the display system. This screen also displays the software version for the 3660 interface board and 3660 display boards.

Up/Down: Move cursor

Enter: Make selection

Cancel: Main menu

4.3.4.1. RECORDS MENU

From this screen, the user may select viewing ride-thru event records or fault records.

Up/Down: Move cursor

Enter: Make selection

Cancel: Main menu

4.3.4.1.1. RIDE-THRU EVENTS MENU

From this screen, the user may select whether to view event statistics or individual event records. The lifetime event counter is also displayed on this screen. The system ships with records of a single event describing the time between final power-off at the factory and the first power-on at installation.

Up/Down: Move cursor

Enter: Make selection

Cancel: Records menu

4.3.4.1.1.1. STATISTICS

This screen displays the number of RTA events since the last statistic reset, and their total and average duration. These records may be reset from the Super menu.

Cancel: ride-thru events menu

4.3.4.1.1.2. INDIVIDUAL EVENTS

This screen displays the time and duration of one of the thirty most recent ride-thru events.

Up: Display a more recent event

Down: Display an older event

Enter: Show the voltage records for the presently selected event

Cancel: Ride-Thru Events menu

4.3.4.1.1.2.1. RIDE-THRU EVENT VOLTAGES

This screen displays the voltages recorded for the selected ride-thru event.

Cancel: Individual Events

4.3.4.1.2. FAULT RECORDS

This screen displays a record of the 100 most recent fault states, including the number of faults, their nature, and the date and time they occurred. Multiple faults are scrolled through at two-second intervals.

Up: Display a more recent fault record

Down: Display an older fault record

Cancel: Records menu

4.3.4.2. ACTIONS MENU

From this screen, the user may select to initialize a ride-thru test, perform a threshold check, or initialize a charger equalize.

Up/Down: Move cursor

Enter: Make selection

Cancel: Main menu

4.3.4.2.1. RIDE-THRU TEST

On this screen, the user is instructed to press and hold the *enter* button to perform a ride-thru test. The test will end when the button is released. The system transitions to the Status screen for the duration of the test.

Enter: Test

Cancel: Actions menu

4.3.4.2.2. THRESHOLD CHECK

On this screen, the user is instructed to remove AC power from the ride-thru cabinet momentarily. This will cause the ride-thru to become active. The display will show the ride-thru output when the ride-thru becomes active. This voltage is the threshold voltage of the ride-thru.

Cancel: Actions menu

4.3.4.2.3. CHARGER EQUALIZE

From this screen, the user may set how long the charger should stay in equalize mode for.

Up: Increment digit

Down: Decrement digit

Left/Right: Move cursor

Enter: Confirm time

Cancel: Actions menu

4.3.4.3. CONFIGURATION MENU

From this screen, the user may set the present time, select what status values are to be displayed on the Status screen, and set the status screen timeout value.

Up/Down: Move cursor

Enter: Make selection

Cancel: Main menu

4.3.4.3.1. SET TIME

On this screen, the user may set the present date and time. There is no automatic adjustment for daylight saving time or other local time variances. For this reason, the user may wish to set the clock to GMT. It is also recommended that this time setting be checked periodically to adjust for drift.

Up: Increment digit

Down: Decrement digit

Left/Right: Move cursor

Enter: Confirm time

Cancel: Configuration menu

4.3.4.3.2. SET STATUS TIMER

On this screen, the user may set how long the system will wait after the last button press before returning to the Status screen. If this time is set to 0 seconds, the Status screen timer is disabled, and the system will not leave the present screen without external stimulus.

Up: Increment digit

Down: Decrement digit

Left/Right: Move cursor
Enter: Confirm time
Cancel: Configuration menu

4.3.4.3.3. STATUS DISPLAYS

The user may select which two voltages or currents will be displayed on the default status screen.

4.4. FAULTS

The KIT 3660DD5 monitors several faults. Some latch until reset, either from the display or by toggling the appropriate enable input. Faults that do not latch automatically reset when the fault condition is no longer present. Each fault activates one of the two fault outputs. Some faults disable either the ride-thru or charger until they are reset. See Table 4-1 to determine which properties apply to each fault.

Table 4-1: KIT 3660DD5 Faults

| FAULT DESCRIPTION | FAULT 1 | FAULT 2 | LATCH | RIDE-THRU DISABLE | CHARGER DISABLE |
|------------------------------|---------|---------|-------|----------------------|--------------------|
| Output Undervoltage | x | | | | |
| Storage Undervoltage | | x | x | Configurable | |
| Storage Overvoltage | x | | x | | x |
| Ride-Thru Not Ready | | x | | | |
| Precharge Not Complete | x | | | | |
| Ride-Thru Overtemp | | x | x | Configurable | |
| Phase 1 Loss | x | | | | |
| Phase 2 Loss | x | | | | |
| Phase 3 Loss | x | | | | |
| Ride-Thru Active Time | | x | x | Configurable | |
| Storage Imbalance | x | | x | | x |
| Storage Overtemp | x | | x | | x |
| Charger Fault | x | | | | |
| Discharge Resistor Overtemp | x | | | | x |
| Display Communication Loss | x | | | | |
| Interface Communication Loss | x | | | | |

4.4.1. OUTPUT UNDERVOLTAGE

This fault indicates that the bus voltage has dropped below the level set in the Super menu.

4.4.2. STORAGE UNDERVOLTAGE

This fault indicates that the storage voltage has dropped below the level set in the Super menu. This fault can be configured in the Super Menu to disable the ride-thru to prevent damage to the storage bank. If capacitors are used, the system will start-up with this fault but can be reset after the capacitor bank is charged above the Storage Undervoltage level.

4.4.3. STORAGE OVERVOLTAGE

This fault indicates that the storage voltage has risen above the level set in the Super menu. There are two overvoltage fault levels, one for normal operation, and one for when the charger is executing an equalize cycle.

4.4.4. RIDE-THRU NOT READY

This fault indicates that the ride-thru is not ready to run.

4.4.5. PRECHARGE NOT COMPLETE

This fault indicates that the ride-thru has not successfully completed precharge.

4.4.6. RIDE-THRU OVERTEMP

This fault indicates that the ride-thru temperature has reached an unsafe level.

4.4.7. PHASE LOSS

This fault indicates that the listed phase has dropped below a preset level for longer than the time set in the Super menu. This is probably due to a blown fuse or incorrect wiring.

4.4.8. RIDE-THRU ACTIVE TIME

This fault indicates that the ride-thru has remained active for longer than the maximum safe time as set in the Super menu.

4.4.9. STORAGE IMBALANCE

This fault indicates that the voltage on one of the individual storage modules has risen to an unsafe level.

4.4.10. STORAGE OVERTEMP

This fault indicates that one of the individual storage modules has exceeded its safe temperature limit.

4.4.11. CHARGER FAULT

This fault indicates that the charger has reported some problem preventing it from continuing to operate.

4.4.12. DISCHARGE RESISTOR OVERTEMP

This fault indicates that the discharge resistor has exceeded its safe temperature limit.

4.4.13. DISPLAY COMMUNICATION LOSS

This fault indicates that the 3660D5 display board has lost communication with the 3660 interface board, probably due to a loose wire or cable.

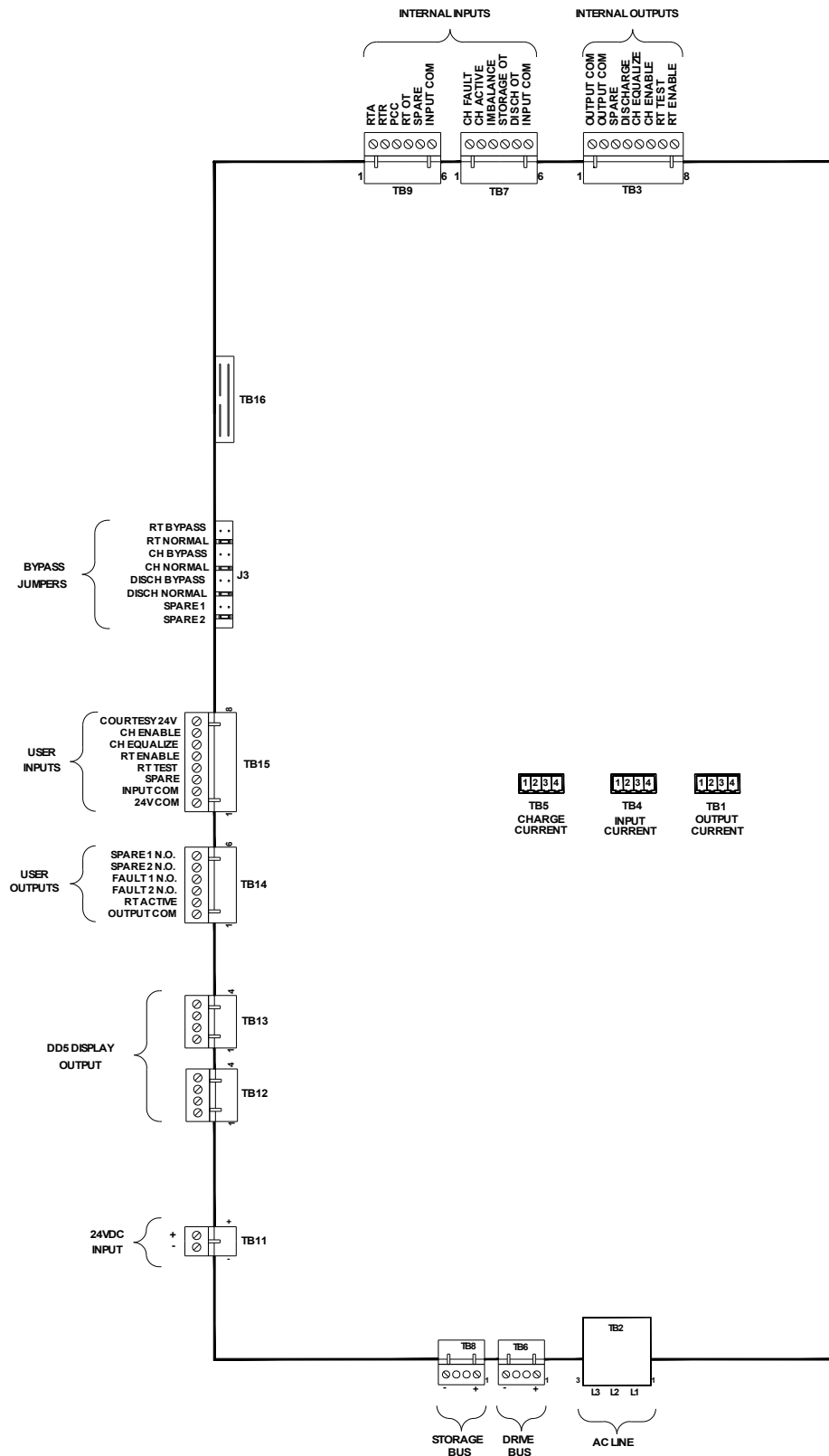
4.4.14. INTERFACE COMMUNICATION LOSS

This fault indicates that the 3660 interface board has lost communication with the 3660D5 display board, probably due to a loose wire or cable.

4.5. SYSTEM AND USER CONNECTIONS

The KIT 3660DD5 requires several connections to operate. These are identified as either system connections or user connections. The system connections are typically done on-site at Bonitron or by an integrator before the system is installed. The user connections are typically done while the system is being installed. All connections are to the 3660 interface board unless otherwise specified.

Figure 4-2: 3660 Interface Board Layout



4.5.1. SYSTEM CONNECTIONS

4.5.1.1. DISPLAY POWER & COMMUNICATION

This connection allows the 3660 interface board to supply the 3660D5 display board with an isolated 24V and provides for serial communication between the boards. Bonitron supplies the cable harness between the interface board and the display board.

4.5.1.2. SYSTEM VOLTAGES

- **AC LINE**

This measures the AC input voltage of the system. Pin 1 is phase 1, pin 2 is phase 2, and pin 3 is phase 3.

- **DRIVE BUS**

This measures the DC output bus voltage of the system. Pin 1 is positive and pin 4 is negative.

- **STORAGE BUS**

This measures the DC storage bus voltage of the system. Pin 1 is positive and pin 4 is negative

4.5.1.3. CONTROL POWER

- **24VDC**

Accepts 24VDC to power the KIT 3660DD5. Pin 1 is negative and pin 2 is positive.



This supply must be floating! Damage may occur if the 24VDC control power is referenced to ground!

4.5.1.4. INTERNAL SYSTEM INPUTS

The internal system inputs are for interconnection of a ride-thru system with the 3660 interface board. These provide information for the KIT 3660DD5 to monitor and control the ride-thru system. See the M3460 and the M3534 manuals for more details.

- **TB9 – 1 (Ride-Thru Active)**

This accepts the Ride-Thru Active signal from the ride-thru.

- **TB9 – 2 (Ride-Thru Ready)**

This accepts the Ride-Thru Ready signal from the ride-thru.

- **TB9 – 3 (Precharge Complete)**

This accepts the Precharge Complete signal from the ride-thru.

- **TB9 – 4 (Ride-Thru Overtemp)**

This accepts the overtemp signal from the ride-thru.

- **TB9 – 5 (Spare)**

This is reserved for future use and has no purpose at this time.

- **TB9 – 6 (System Input Common)**

This is the common used with all system inputs.

- **TB7 – 1 (Charger Fault)**

This accepts the fault signal from the charger.

- **TB7 – 2 (Charger Active)**

This accepts the charging signal from the charger.

- **TB7 – 3 (Storage Imbalance)**

This accepts the Imbalance fault signal from the charger.

- **TB7 – 4 (Storage Overtemp)**

This accepts the overtemp signal from the storage device.

- **TB7 – 5 (Discharge Overtemp)**

This accepts the overtemp signal from the discharge resistor.

- **TB7 – 6 (System Input Common)**

This is the common used with all system inputs.

4.5.1.5. INTERNAL SYSTEM OUTPUTS

- **TB3 – 1 (System Output COM)**

This is the common used with all system outputs.

- **TB3 – 2 (System Output COM)**

This is the common used with all system outputs.

- **TB3 – 3 (Spare Output)**

This is reserved for future use and has no purpose at this time.

- **TB3 – 4 (Discharge Output)**

This is reserved for future use and has no purpose at this time.

- **TB3 – 5 (Charger Equalize Output)**

This causes the charger to enter equalize mode.

- **TB3 – 6 (Charger Enable Output)**

This enables the charger, allowing it to operate.

- **TB3 – 7 (Ride-Thru Test Output)**

This causes the ride-thru to enter test mode.

- **TB3 – 8 (Ride-Thru Enable Output)**

This enables the ride-thru, allowing it to operate.

4.5.1.6. CURRENT SENSORS

- **TB5 – 1, TB4 – 1, & TB1 – 1 (+15V)**

These supply +15V to the system current sensors.

- **TB5 – 2, TB4 – 2, & TB1 – 2 (-15V)**

These supply -15V to the system current sensors.

- **TB5 – 3 (Charge Current Signal)**

This is the input for the feedback from the charge current sensor.

- **TB4—3 (Input Current Signal)**

This is the input for the feedback from the input current sensor.

- **TB1—3 (Output Current Signal)**

This is the input for the feedback from the output current sensor.

- **TB5 – 4, TB4 – 4, & TB1 – 4 (Current Sensor COM)**

These are the common to the system current sensors.

4.5.2. USER CONNECTIONS

4.5.2.1. USER INPUTS

- **TB15-8 (Courtesy 24V)**

This provides an isolated 24V, which may be used to drive the user inputs.

- **TB15-7 (CH Enable)**
This input enables the charger.
- **TB15-6 (CH Equalize)**
This input initializes an equalize cycle on the charger.
- **TB15-5 (RT Enable)**
This input enables the ride-thru.
- **TB15-4 (RT Test)**
This input initializes a test cycle of the ride-thru.
- **TB15-3 (Spare)**
This is reserved for future use and has no purpose at this time.
- **TB15-2 (Input COM)**
This is the common used with all user inputs.
- **TB15-1 (24V COM)**
This is the common to the courtesy 24V supply. This must be connected to the "Input Com" if the courtesy 24V is used to drive the inputs.

4.5.2.2. USER OUTPUTS

- **TB14-6 (Spare 1 NO)**
This is reserved for future use and has no purpose at this time.
- **TB14-5 (Spare 2 NO)**
This is reserved for future use and has no purpose at this time.
- **TB14-4 (Fault 1 NO)**
This output closes to "Output Com" when there is no class 1 fault.
- **TB14-3 (Fault 2 NO)**
This output closes to "Output Com" when there is no class 2 fault.
- **TB14-2 (RT Active)**
This output closes to "Output Com" when the ride-thru is active.
- **TB14-1 (Output COM)**
This is the common used with all user outputs.

4.5.2.3. USER JUMPERS (J3)

- **RT Bypass**
This position prevents the KIT 3660DD5 from disabling the ride-thru.
- **RT Normal**
This position allows the KIT 3660DD5 to disable the ride-thru.
- **CH Bypass**
This position prevents the KIT 3660DD5 from disabling the charger.
- **CH Normal**
This position allows the KIT 3660DD5 to disable the charger.
- **DISCH Bypass**
This is reserved for future use and has no purpose at this time.

- **DISCH Normal**

This is reserved for future use and has no purpose at this time.

- **Spare Bypass 1**

This is reserved for future use and has no purpose at this time.

- **Spare Normal 2**

This is reserved for future use and has no purpose at this time.

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.

If a problem occurs on start-up or during normal operation, refer to the problems described below. If a problem persists after following the steps below, contact the product supplier or your system integrator for assistance.

5.1. TROUBLESHOOTING GUIDE

RECORDED EVENT TIMES ARE INACCURATE

Ensure that system time is set correctly. Note that altering the system time will not alter the recorded times of previously stored events.

DISPLAYED VOLTAGES AND CURRENTS DO NOT MATCH OBSERVED VALUES

The system needs calibration. Contact Bonitron.

SYSTEM TIME RESETS AFTER POWER OUTAGE

The battery in the display board needs to be replaced. This is not a user serviceable part. Contact Bonitron.

RTR AND PCC FAULTS NEVER CLEAR

Confirm that the external enable/disable signal is wired correctly. Confirm the voltage of the external enable/disable signal with a voltmeter.

OTHER FAULTS OCCUR AND DO NOT CLEAR

Consult the manual for associated (M3460 or M3534) ride-thru.

DRIVE TRIPS ON GROUND FAULT

Ensure that the 24V supply voltage at TB11 of the 3660 interface board is floating, and not referenced to ground.

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6. ENGINEERING DATA

6.1. CURRENT SENSORS

Every KIT 3660DD5 comes with two current sensors, one for the boost module input current and one for the boost module output current.

If the ride-thru system being monitored has a charger, then the monitoring option is a "C" which includes a third current sensor. See Section 2.2

Tables 6-1 and 6-2 can be used to identify where each of these current sensors should be used. Be careful to verify the correct current sensor is used in the appropriate location and the polarity is correct, as failure to do so could result in damage to the current sensor or malfunction of the system. Be sure to identify these by the part number on each part.

Table 6-1: Current Sensor Part Numbers

| SENSOR RATING | PART NUMBER |
|---------------|--------------|
| 50 A | LEM HAS50-S |
| 100 A | LEM HAS100-S |
| 200 A | L34S200D15 |
| 400 A | L34S400D15 |
| 600 A | L34S600D15 |
| 1000 A | L03S1000D15 |

Table 6-2: Current Sensor Selection

| RIDE-THRU SERIES | RATED OUTPUT CURRENT | MODEL NUMBER | INPUT CURRENT SENSOR | OUTPUT CURRENT SENSOR | CHARGE CURRENT SENSOR |
|------------------|----------------------|---------------------|----------------------|-----------------------|-----------------------|
| M3460R | 85 A | KIT 3660DD5-200100C | 200 A | 100 A | 50A |
| | | KIT 3660DD5-200100X | | | n/a |
| | 127 A | KIT 3660DD5-400200C | 400 A | 200 A | 50 A |
| | | KIT 3660DD5-400200X | | | n/a |
| | 170 A | KIT 3660DD5-400200C | 400 A | 200 A | 50 A |
| | | KIT 3660DD5-400200X | | | n/a |
| | 255 A | KIT 3660DD5-600400C | 600 A | 400 A | 50 A |
| | | KIT 3660DD5-600400X | | | n/a |
| | 340 A | KIT 3660DD5-600400C | 600 A | 400 A | 50 A |
| | | KIT 3660DD5-600400X | | | n/a |
| | 425 A | KIT 3660DD5-1K0400C | 1000 A | 400 A | 50 A |
| | | KIT 3660DD5-1K0400X | | | n/a |
| M3460B | 85 A | KIT 3360DD5-200100C | 200 A | 100 A | 50 A |
| | | KIT 3660DD5-200100X | | | n/a |
| | 127 A | KIT 3660DD5-400200C | 400 A | 200 A | 50 A |
| | | KIT 3660DD5-400200X | | | n/a |
| | 170 A | KIT 3660DD5-400200C | 400 A | 200 A | 50 A |
| | | KIT 3660DD5-400200X | | | n/a |
| | 255 A | KIT 3660DD5-600400C | 600 A | 400 A | 50 A |
| | | KIT 3660DD5-600400X | | | n/a |
| | 340 A | KIT 3660DD5-600400C | 600 A | 400 A | 50 A |
| | | KIT 3660DD5-600400X | | | n/a |
| | 425 A | KIT 3660DD5-1K0400C | 1000 A | 400 A | 50 A |
| | | KIT 3660DD5-1K0400X | | | n/a |
| M3534 | 20 A | KIT 3360DD5-050050C | 50 A | 50 A | 50 A |
| | | KIT 3660DD5-050050X | | | n/a |
| | 40 A | KIT 3360DD5-100050C | 100 A | 50 A | 50 A |
| | | KIT 3660DD5-100050X | | | n/a |
| | 85 A | KIT 3360DD5-200100C | 200 A | 100 A | 50 A |
| | | KIT 3660DD5-200100X | | | n/a |

6.2. DIMENSIONS AND MECHANICAL DRAWINGS

Figure 6-1: Interface Module Enclosure Dimensional Outline

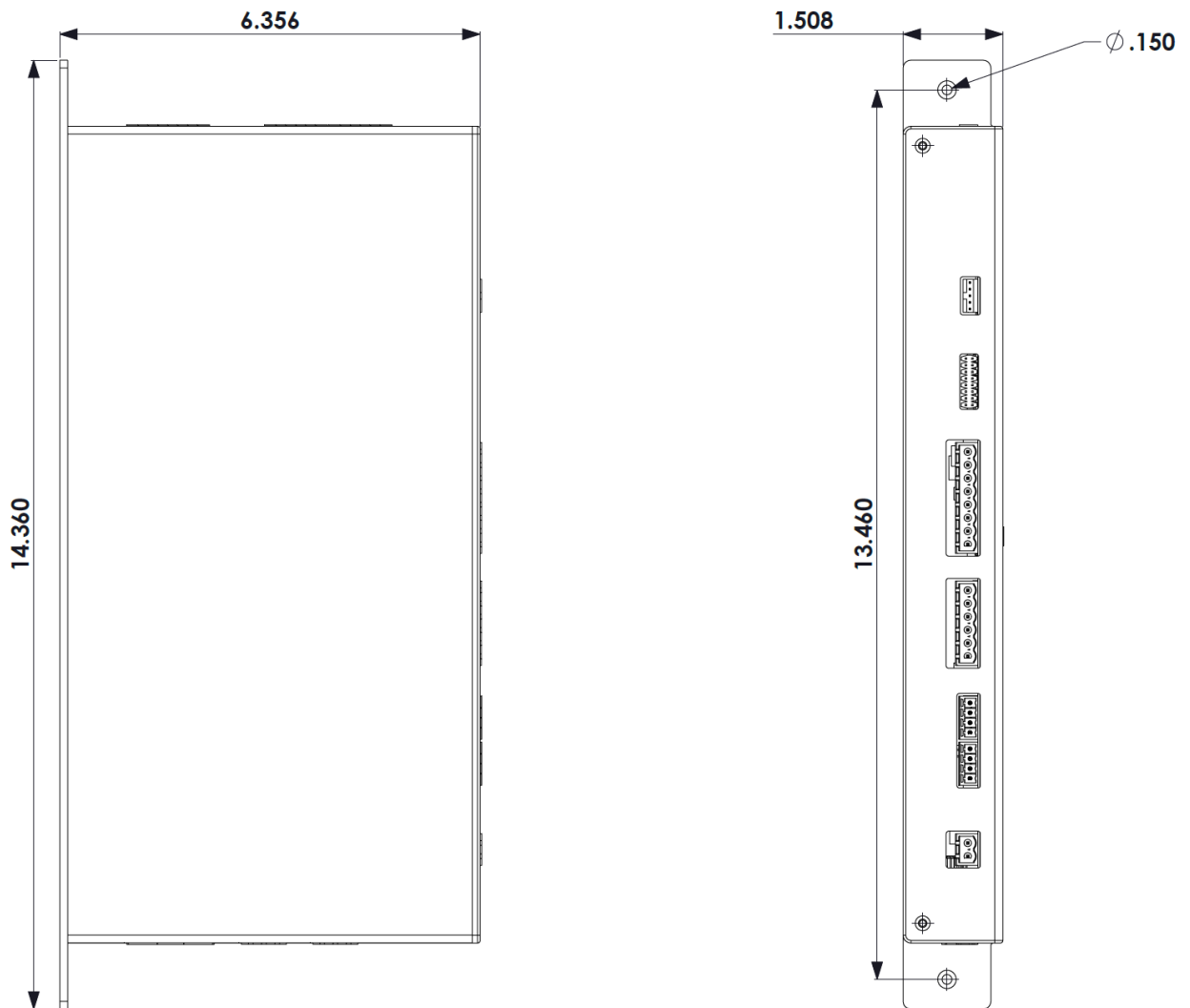
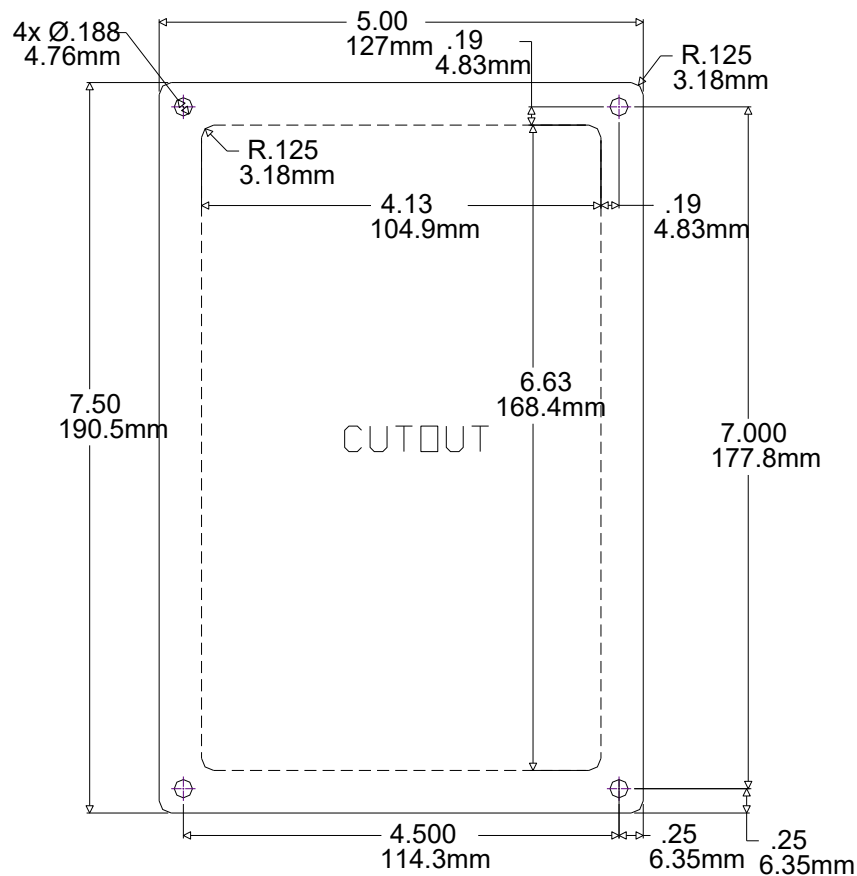


Figure 6-2: Display Panel Dimensional Outline

6.3. CERTIFICATIONS

All units conform to ISO/IEC Guide 22 for Standards EN-61326-1:2013 and UL 61010-1:2012, rev 2019, including all regional differences for the EU Group.

All units conform to UL and cUL regulation for Standards UL 61010-1, 3rd Edition, May 11, 2012, revised July 19, 2019, UL 61010-2-201, 2nd Edition, and UL 61010-2-030, 2nd Edition.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

KIT 3660DD5
