AKRON®
BRASS COMPANY

Style 6033 MINI UNIVERSAL CONTROL
INSTALLATION, OPERATION & MAINTENANCE MANUAL

123066

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

SAFETY SUMMARY

SIGNAL WORD DEFINITION

Per the ANSI Z535.4 standard, the following signal words and definitions are used to indicate hazardous situations:

⚠ DANGER DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices.

SPECIFIC SAFETY PRECAUTIONS

The following are safety precautions that are related to specific procedures and therefore appear elsewhere in this publication for emphasis. These are recommended precautions that personnel must understand and apply during specific phases of installation, operation and maintenance.

⚠ WARNING

For outdoor use only. Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

⚠ WARNING

Make sure all power has been disconnected and disable flow prior to performing maintenance.

⚠ WARNING

Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ WARNING

DO NOT stow or deploy the monitor/turret while flowing. Pressing the stow or deploy buttons causes the nozzle to move automatically and the water stream may cause damage to equipment or injury to personnel.

⚠ WARNING

DO NOT install shutoffs on the outlet of the monitor/turret. Shutoffs increase the potential for pressure surges due to water hammer, which have the potential to cause an injury or damage to the monitor/turret.

⚠ WARNING

Keep all personnel out of the Danger Zone in front of the outlet of the nozzle when the water source is attached. Dangerous flow velocities can cause serious injury.

⚠ CAUTION

Tangled cables can cause equipment damage. Ensure control cables are not tangled and are free to pay out as monitor/turret is operated.

⚠ CAUTION All operators must read the Operation section of this manual and be properly trained.

⚠ CAUTION Use only appropriate Akron Brass Company nozzles. Use of any other nozzles could affect the speed or operation of the monitor/turret.

⚠ CAUTION Make the connection of the vehicle and/or auxiliary battery the final step.

⚠ CAUTION The monitor/turret contains moving parts. Keep hands, fingers, and objects away from pinch points.

CHAPTER 1
INTRODUCTION

1.1 SAFETY PRECAUTIONS
Refer to the Safety Summary for precautions to be observed while operating or servicing this equipment.

1.2 INTRODUCTION
This manual covers the installation, operation, troubleshooting and maintenance instructions for the Style 6033 Mini Universal Control. The manual should be reviewed in its entirety. This manual is intended to provide installation, operation and maintenance information for Mini Universal configurations in general. Contact the Akron Brass factory with any additional questions before performing any procedures outlined in this manual.

1.3 DESCRIPTION
The Mini Universal is a product used to control Akron Brass single motor devices such as electrically actuated valves and telescoping risers. The unit is designed for installation on any vehicle for the purpose of providing control of these devices. Refer to Figure 1 -1 for identification of the Mini Universal Control Box.

Figure 1-1

Mimi Universal Control

1.4 TECHNICAL INFORMATION

1.4.1 Power Requirements

The Mini Universal will operate from either 12 or 24 volt DC power with no customer changes necessary, although electrically actuated valves and telescoping risers must be ordered as 12 or 24 volt for their proper operation. While the Mini Universal can operate below 10 volts, for optimum performance, a minimum of 11 volts (for 12 volt monitors/turrets, 22 volts for 24 volt monitors/turrets) is required at the Mini Universal connector. The DC power is internally protected with a 30 amp non-serviceable fuse. This fuse is strictly for wiring protection and should never need replacement under normal conditions. It is recommended that an external 20 amp slow blow fuse be placed in series with the vehicle battery positive lead. The DC power for the Mini Universal is supplied through a 2 pin Deutsch connector. The DC power connects to pins 1 and 2, and they accept up to 12 AWG wire. See section 2.4.1 for pin-out information. The electronic system has built-in reverse polarity protection. Long runs of cable can introduce voltage/power loss. For long runs, it may be necessary to add an intermediate junction box fed by 10 AWG or heavier wiring with a short 12 AWG run applied to the Mini Universal. If you need assistance in assessing wiring needs associated with long wiring runs, contact Akron Brass technical support.

INPUT POWER REQUIREMENT: 12VDC (Min: 11VDC; Max: 14VDC) OR
24VDC (Min: 22VDC; Max: 28VDC)

RECOMMENDED POWER WIRE SIZE: 12VDC: 12AWG (see above discussion)
24VDC: 12AWG

REQUIRED EXTERNAL FUSE: 12VDC: 20 amp Slow Blow
24VDC: 10 amp Slow Blow

MAX CONTINUOUS AMP DRAW: (see spec. sheet for device being driven)

PEAK AMP DRAW: 50amp for 100ms for valve (100amp for 3406 Hi-Riser)

1.4.2 Environmental Specifications Requirements

The Mini Universal has been designed to be mounted on a vehicle and tolerate the harsh environments encountered in this application. The environmental specifications are listed below:

Operating Temperature Range: -40°C - 55°C

Enclosure Environmental Rating: IP67 Equivalent

CHAPTER 2
INSTALLATION

⚠ CAUTION Only trained and qualified personnel should perform installation, adjustments, and servicing. Only a properly trained and qualified certified electrician should perform electric installations and service.

⚠ CAUTION Make the connection of the vehicle and/or auxiliary battery the final step.

2.1 INTRODUCTION

The Mini Universal has been designed to provide ease of installation. This section of the manual provides the procedures that must be followed to insure a successful installation. Be sure to read and understand the entire installation procedure before you begin.

Table2 1 provides a list of tools and materials required to install and test the Mini Universal.

Wrenches	Deutsch Crimping tool
Screwdrivers	Wire cutter/stripper
1/4-20, M5, or M6 Mounting Hardware (2 req'd)	Multimeter (to verify power is turned OFF)
Torque wrench	Clean Shop Rags
Akron Brass 122365 Connector Kit (Included)	

Table 2-1 Tools and Materials Required for Installation

2.2 UNPACKING

Unpack the Mini Universal as follows:

Carefully open and remove all parts from shipping container.

Inspect for any shipping damage. If damage has occurred, notify carrier.

Be sure that all components are included and that the required tools are readily available.

2.3 ATTACHING TO VEHICLE

If the Mini Universal is to be mounted in a well, be certain that adequate drainage is provided. While the unit has been designed to withstand adverse environmental conditions, it cannot be submerged. In the case of use with a 3406 Riser, the Mini Universal is mounted directly to the side of the Riser on pre-threaded bosses.

The Mini Universal has one option for mounting:

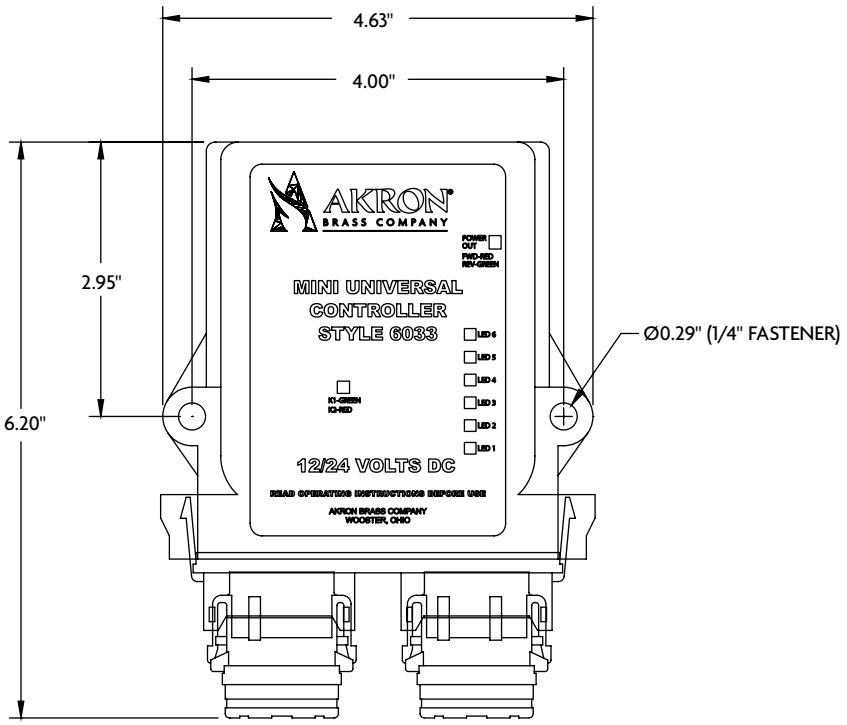
Through hole mounting. The through hole mounting holes provided on the Mini Universal are .29 inches in diameter and suitable for $^1/_4$-20, M5 or M5 screws. These allow inserting screws from the top side and into threaded holes on the customer's back panel.

Mounting hole locations for the above method is shown in Figure 2-1. Please note that it is important that the mounting surface be flat. Sufficient room should also be allowed in mounting location to insure cabling does not have sharp bends close to the connectors.

DO NOT OVERTIGHTEN SCREWS AS ENCLOSURE COULD BE DAMAGED.

Figure 2-1

Mini Universal Mounting Hole Locations



2.4 CABLE(S) INSTALLATION

2.4.1 DC Power Cable

This 2 pin connector provides a connection point for power from the vehicle. The recommended connector for use on the customer harness is a Deutsch part number DTP06-2S-E003 or equivalent. The wires are best crimped in the pins although careful soldering is possible. A crimping tool is available from Ladd Industries part number HDT-48-00. Please refer to Table 2-2 and Figure 2-2 for pin-out information. The Mini Universal normally comes with a mating connector kit. NOTE: For ease of installation, a separate connector kit including connector, pins, and sealing plugs (for unused pins) can be ordered as part number 122365 from Akron Brass.

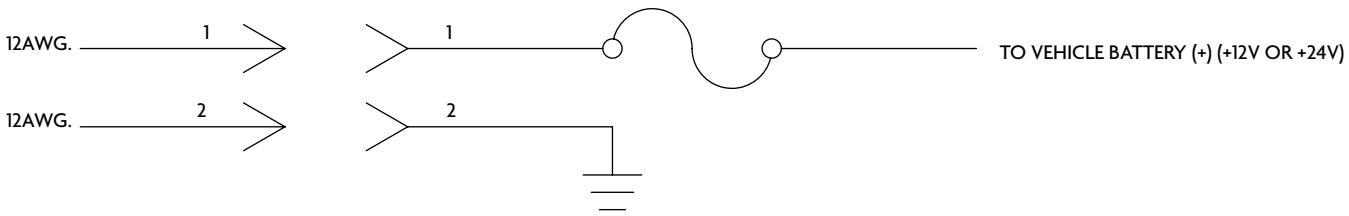
Pin Number	Function	Wire Color on Mini
1	12/24 Battery Power	Red
2	Ground/Common	Black

Table 2-2 DC Power Connector Pin-out

The vehicle battery must be connected to pins 1 and 2 of the DC Power connector. Pin 1 must connect to +Battery and pin 2 must connect to –Battery (usually chassis, ground, or common). It is recommended that a 20 amp slow blow fuse be connected in series with the +Battery wire. Refer to section 1.4.1 for additional information.

Figure 2-2

Vehicle Battery Connection



2.5 VEHICLE INTERFACE CABLE

This gray 12 pin connector provides a connection point for signals to/from the vehicle. The Vehicle Interface connector requires a Deutsch DTM06-12SA-E007 or equivalent connector on the user harness. This connector should be included in the 122365 connector kit that came with the Mini Universal. In the event of troubleshooting, Table 2- 3 is provided for reference.

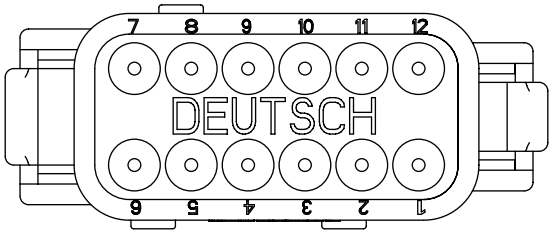
2.5.1 Vehicle interface Connector (Gray) Pin-out

Pin Number	Type	Function	Comments
1	12/24 Power Out	Power for remote device	1.1 Amp Max.
2	Ground/Common		
3	CAN-H	CAN Network	J1939
4	CAN-L		
5	12/24 Power Out	Power for remote device	1.1 Amp Max.
6	Ground/Common		
7	Data B (+)	RS-485 Network	VMUX or RS-485
8	Data A (-)		
9	Relay Contact		2 Amps Max.
10			
11	Relay Contact		2 Amps Max.
12			

Vehicle Interface Connector Pin-out

Figure 2-3

Deutsch DTM06-12SA-E007 (from rear)

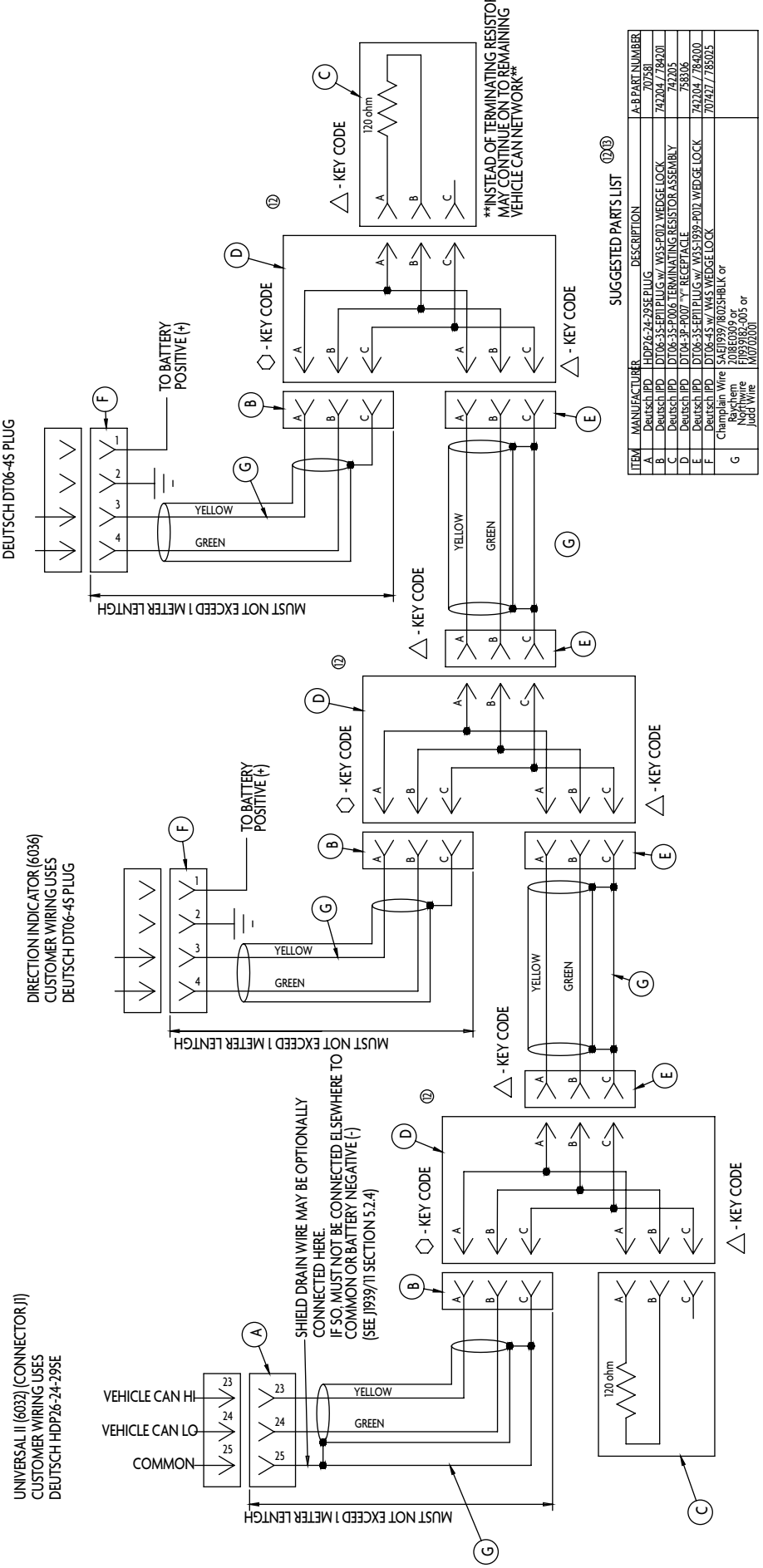


2.5.2 J1939 Vehicle CAN Bus (Optional)

The Mini Universal J1939 Vehicle CAN Bus is available on pins 3 and 4. Pin 3 is CAN-HI, and pin 4 is CAN-LO. Preferred connection to these pins should be made with J1939/11 compliant wiring. See Figure 2-5 for additional details. NOTE: Termination resistors are critical to reliable performance. Pins 1 and 2 can be utilized to power a remote CAN device. Pin 1 is fused with a self-resetting fuse at 1.1 amps. If this optional feature is not used, it is recommended these pin locations be fitted with Deutsch pin sealing plugs.

Figure 2-5

J1939 CAN Wiring



SUGGESTED PARTS LIST ⑫⑬

ITEM	MANUFACTURER	DESCRIPTION	A-B PART NUMBER
A	Deutsch IPD	HDP26-24-29SE PLUG	70758
B	Deutsch IPD	DT06-3S-EP11 PLUG w/ W3S-P012 WEDGE LOCK	742204 / 784201
C	Deutsch IPD	DT06-3S-P006 TERMINATING RESISTOR ASSEMBLY	764205
D	Deutsch IPD	DT04-3P-P007 "Y" RECEPTACLE	758306
E	Deutsch IPD	DT06-3S-EP11 PLUG w/ W3S-1939-P012 WEDGE LOCK	742204 / 784200
F	Deutsch IPD	DT06-4S w/ W4S WEDGE LOCK	707477 / 785025
G	Champlain Wire Raychem Nortfitwire Judd Wire	SAEJ1939/18025HBLK or 2108E0309 or F1939182-2005 or M0702001	

2.6 DEVICE I/O CABLE

This black 12 pin connector provides a connection point for I/O signals to/from the device and the vehicle. The recommended connector is a Deutsch part number Deutsch DTM06-12SB-E007. Please refer to Table 2-4 and Figure 2-3 for pin-out information. NOTE: For ease of installation, a connector kit including connector, pins, and sealing plugs (for unused pins) is included with the Mini Universal, but is available separately as part number 122365 from Akron Brass.

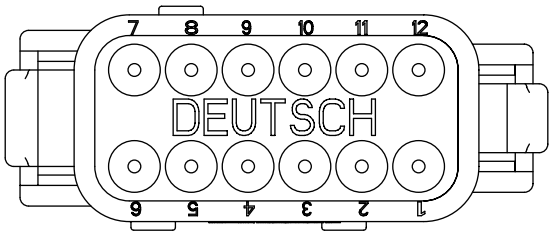
2.6.1 Device I/O Connector (Black) P in-out

Pin Number	Type	Function	Comments
1	12/24 Power Out	Power for switches	0.1 Amp Max.
2	Switch Input #1		
3	Switch Input #2		
4	Switch Input #3		
5	Switch Input #4		
6	Switch Input #5		
7	Ground/Common		
8	Analog In #1		(0 to 5 VDC)
9	Analog In #2		(0 to 5 VDC)
10	Analog In #3		(0 to 5 VDC)
11	Analog In #4		(4 to 20 ma.)
12	Analog Exc.	Sensor Power	(5 VDC)

Table 2-4 Device I/O Connector Pin-out

Figure 2-4

Deutsch DTM06-12SA-E007 (from rear)



2.6.2 $^{12}/_{24}$ Power Out

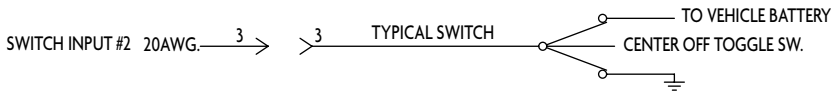
Pin 1 supplies power out for use of powering switches. It is internally fused by a self-resetting fuse, and will be at roughly the same potential as the DC power coming in. Use of this pin is optional, but connecting switch inputs to external battery potential carries with it the restriction noted at the end of section 2.6.3.

2.6.3 Switch Inputs

Switch Inputs #1 to #5 (pins 2 to 6) are primarily intended for toggle switch input. Their function varies depending on configuration. An Akron Brass Operator Station can be used or users can provide their own switch inputs. Please refer to the Control Drawing for the particular version Mini Universal for their assigned function. The Mini Universal version is identified by a barcode label on the outside of the enclosure back that includes the part number (6033XXXX) and revision level. Each input recognizes three distinct states – open, connected to +Bat, and connected to –Bat. A typical toggle switch connection is shown in Figure 2-4. Use of relay contacts could also be implemented if care is taken to insure there is never a case in which the battery is shorted out. A form C contact is a good choice in which the common is tied to the switch input.

Figure 2-7

Switch Input Wiring



Unused switch input pins should be fitted with Deutsch pin sealing plugs. These are included in the connector kit from Akron Brass.

NOTE: If any of the switch inputs are still connected to battery + after power is removed to the Mini Universal, the control will not properly shut down due to leakage currents through the inputs. Insure that battery + for the switch inputs is disconnected along with power to the Mini Universal.

2.6.4 Analog Inputs

The Mini Universal has four analog inputs. Inputs #1 to #3 (on pins 8 to 10 respectively) are for use with 0 to 5 volts DC signals. Input #4 (pin 11) is for use with 4 to 20 ma. signals. Pins 7 and 12 provide 5 volts DC excitation for use with appropriate transducers.

2.7 PRE-OPERATIONAL CHECK

⚠ WARNING Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

Before operating the Mini Universal and monitor/turret, be sure that there are no potential obstructions. Visually inspect the unit for any damage. If damage is apparent, do not use the system. Have it serviced prior to use. Check for any objects which might obstruct motion of the monitor/turret or cause binding. Remove any material that may hinder monitor/turret function.

CHAPTER 3
OPERATING INSTRUCTIONS

⚠ WARNING All operators must read the Operation section of this manual and be properly trained.

⚠ WARNING Keep personnel clear of monitor/turret discharge path during operation.

⚠ WARNING For outdoor use only. Do not use in areas that have been classified as hazardous as defined in Article 500 of the National Electric Code.

3.1 THEORY OF OPERATION

The Mini Universal control system is based on a distributed intelligence control structure. Each device in the system has a circuit board with an embedded micro controller. These devices can include (but are not limited to): the 6032 Universal II Control Box, the 6033 Mini Universal, the 6034 CAN Operator Interface, the 6035 CAN Joystick, the 6036 CAN Direction Indicator, the 6037 CAN Wireless Interface, and the associated handheld Remote Control(s). These boards "talk" to each other over an SAE J1939 compliant CAN serial communications link.

The 6033 Control device is a software-defined universal controller. Its inputs and outputs are pre-programmed at the factory to match the particular device it is used with. Please refer to the CHAPTER 5 for the particular version Mini Universal for their assigned function. The Mini Universal version is identified by a barcode label on the outside of the enclosure that includes the part number (6033XXXX) and revision level.

3.2 DESCRIPTION OF SWITCH FUNCTIONS

The Mini Universal has five switch inputs located on the Device I/O (Black) connector (see Figure 2-6 and Table -2-4). Below are the various functions that the Mini Universal switch inputs can provide. Each variant of 6033 will have some combination of these, but not necessarily all or in the order presented here.

NOTE: The Mini Universal switch inputs are three-state inputs. Refer to section 2.6.3 for additional information and proper wiring.

3.2.1 Extend Switch

This switch input provides capability for extending the Hi-Riser when deploying the monitor/turret with which it is associated. This switch input is typically driven by the relay output of a Universal I in legacy applications. Connection to +Battery by switch, hardwiring, or some other appropriate device will initiate operation. The Hi-Riser will extend until the hard stop at the full extent of travel is reached.

3.2.2 Retract Switch

This switch input provides capability for retracting the Hi-Riser when stowing the monitor/turret with which it is associated. This switch input is typically driven by the relay output of a Universal I in legacy applications. Connection to +Battery by switch, hardwiring, or some other appropriate device will initiate operation. The Hi-Riser will retract until the hard stop at the full extent of travel is reached.

3.3 DESCRIPTION OF RELAY OUTPUT FUNCTIONS

The Mini Universal has two relay outputs located on the vehicle interface connector (see Figure 2-4 and Table 2-3). Below are the various functions that the Mini Universal relay outputs can provide. Each variant of 6033 will have some combination of these, but not necessarily all or in the order presented here.

NOTE: The Mini Universal relay outputs are floating contacts. Refer to section 2.5.4 for additional information and proper wiring.

3.3.1 Hi-Riser Extended

The relay contact output closes when the Hi-Riser has completed extending and remains closed until the monitor moves away from that position. This relay contact is from a latching relay, and therefore maintains its state regardless of power to the Mini Universal.

3.3.2 Hi-Riser Retracted

The relay contact output closes when the Hi-Riser has completed retracting and remains closed until the monitor moves away from that position. This relay contact is from a latching relay, and therefore maintains its state regardless of power to the Mini Universal.

3.4 PRIORITY OF COMMAND INPUTS

Command inputs can have multiple sources. One source is from switch inputs as outlined in section 3.2. Command inputs can also come from J1939 CAN messages. This type command input takes the form of proprietary J1939 messages issued by the 6032 Universal II control. The switch inputs have the highest priority. Then CAN network commands take the next lower priority. Thus a Master/ Slave hierarchy can be established by using the appropriate command method.

3.5 NORMAL OPERATION

The device may be moved by any of the command inputs mentioned above with the corresponding action occurring. For instance, if a Deploy switch on a Universal II monitor/turret control is activated, the Universal II will issue a CAN message to the Mini Universal and the Hi-Riser will move the monitor/turret upward for continuation of the Deploy sequence on the monitor/turret. If a Stow switch on a Universal monitor/turret control is activated, the Universal II will issue a CAN message to the Mini Universal and the Hi-Riser will move the monitor/turret downward for completion of the Stow sequence on the monitor/turret.

CHAPTER 4
MAINTENANCE AND SERVICE INSTRUCTIONS

4.1 MAINTENANCE INSTRUCTIONS

The Mini Universal has no user-serviceable parts, but steps can be taken to extend its trouble-free operation.
Periodically check cabling for insulation cracking and wire connections for frayed wires.
Insure there is no standing water around the enclosure.
Check all mounting hardware to insure proper tightness.

4.2 TROUBLESHOOTING ELECTRICAL

4.2.1 Operating Environment

One of the most common causes of improper operation is trying to operate outside of the stated system requirements. (See section 1.4.1 for DC power requirements). A good method of checking the voltage at the Mini Universal is to connect a voltmeter to the wires/pins of the Peripheral Power Output on the DC Power/Signal cable (pins 22 and 25). Refer to section 2.4 and Figure 2-2 for additional information. This will give a good indication of power loss across the DC cabling. For long runs, it may be necessary to add an intermediate junction box in the DC cable so that DC power can be applied closer to the Mini Universal.

4.2.2 Common Electrical Issues

Symptom	Potential Cause	What to Check	Solution
Totally Inoperative	Lack of Power	Remove the Power Cable connector from the Mini Universal box. Check for voltage approximately equal to vehicle battery voltage between pins 1 and 2.	If no measurable voltage is present, insure proper DC power is applied to pins 1 and 2. (See section 1.4.1 and section 2.4.1 for DC power requirements)
	Internal Fuse Blown	Leaving the Power/Signal Cable connected, remove the Device I/O Connector (Black). Check the voltage between pins 7 and 12 (Sensor Power) on the Mini Universal.	If approximately 5 volts exists between pins 7 and 12, and LED #3 is on, the internal fuse is blown. This fuse is not user-serviceable and indicates additional damage inside the control. Contact Akron Brass to return the Mini Universal for service or exchange.
	Motor or Motor wiring open	Is LED #3 on? If so, check Motor and associated wiring continuity	If no continuity, repair wiring and/or Motor.
Switches function properly, but CAN Joystick and other network devices do not	CAN bus is improperly wired	Check CAN bus wiring	Rewire CAN bus
	CAN bus is improperly terminated	Turn off system power and remove the Vehicle Interface Cable connector. Measure the resistance between pins 3 and 4.	If the resistance does not measure between 50 and 70 ohms, insure that the CAN network is properly terminated. (See section 2.5.2)

4.3 AKROVIEW SOFTWARE

As with all of the Akron Brass CAN product family, the 6033 Mini Universal supports the Akroview Software. The software provides additional diagnostics as well as software updating and other capabilities. Contact Akron Brass for additional information on how you can obtain a copy of Akroview software.

CHAPTER 5
MINI UNIVERSAL VARIANT DETAILS

5.1 60330003 MONITOR HI-RISER CONTROL

BLACK CONNECTOR		
Pin	**Function**	**Configuration**
1	12/24 Power Out	Vehicle Battery +
2	Switch Input #1	Retract Command Input (Active when connected to Pin #1)
3	Switch Input #2	Extend Command Input (Active when connected to Pin #1)
4	Switch Input #3	Unused
5	Switch Input #4	Unused
6	Switch Input #5	Unused
7	Ground/Common	Unused
8	Analog In #1	Unused
9	Analog In #2	Unused
10	Analog In #3	Unused
11	Analog In #4	Unused
12	Analog Exc.	Unused

GRAY CONNECTOR		
Pin	**Function**	**Configuration**
1	12/24 Power Out	Vehicle Battery +
2	Ground/Common	Retract Command Input (Active when connected to Pin #1)
3	CAN-H	Extend Command Input (Active when connected to Pin #1)
4	CAN-L	Unused
5	12/24 Power Out	Unused
6	Ground/Common	Unused
7	Data B (+)	Unused
8	Data A (-)	Unused
9	Relay Contact	Contact closes when Riser is fully retracted
10		
11	Relay Contact	Contact closes when Riser is fully extended
12		

NOTE: It is always best to consult the control drawing D-44488 for up to date details.

REVISIONS

Revision 0, October 2011: Initial Release.

2.5.3 V-MUX Communication Bus (Optional)

Connection to a VMUX communications bus is available on pins 7 and 8. Pin 7 is DATA B and Pin 8 is DATA A. Not all software versions support VMUX communication. Contact Akron Brass technical support for details of your particular version. Pins 5 and 6 can be utilized to power a remote VMUX device. Pin 5 is fused with a self-resetting fuse at 1.1 amps. If this optional feature is not used, it is recommended these pin locations be fitted with Deutsch pin sealing plugs. If this option is desired, please contact Akron Brass for additional details.

2.5.4 Relay Outputs

Two relay outputs are provided for indication of the state of the Mini Universal and its load. These two outputs are totally floating, and independent of each other. Additionally, they are latching relays and maintain their state regardless of whether the Mini Universal is powered or not. Pins 9 and 10 connect to one relay contact, and pins 11 and 12 connect to the other relay contact. Their function is defined in software at the factory. Please refer to the drawing for the version of 6033 in possession. The Mini Universal version is identified by a barcode label on the outside of the enclosure and located on the back that includes the part number (6033XXXX) and revision level.

Figure 2-4

Relay Contact Output Wiring