



**CAN & Auxiliary I/O Option
for
Flex+Drive^{II} and MintDrive^{II}**

Reference Manual

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For a period of two (2) years from the date of original purchase, Baldor will repair or replace without charge controls and accessories that our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee expressed or implied. Baldor shall not be held responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person or property caused by items of our manufacture or sale. (Some countries and U.S. states do not allow exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply.) In any event, Baldor's total liability, under all circumstances, shall not exceed the full purchase price of the control. Claims for purchase price refunds, repairs, or replacements must be referred to Baldor with all pertinent data as to the defect, the date purchased, the task performed by the control, and the problem encountered. No liability is assumed for expendable items such as fuses. Goods may be returned only with written notification including a Baldor Return Authorization Number and any return shipments must be prepaid.

Product notice

Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to start-up, program or troubleshoot this equipment.

Safety Notice

Intended use: Drives incorporating the CAN & Auxiliary I/O option are intended for use in stationary ground based applications in industrial power installations according to the standards EN60204 and VDE0160. They are designed for machine applications that require variable speed controlled three-phase brushless AC motors. These drives are not intended for use in applications such as:

- Home appliances
- Medical instrumentation
- Mobile vehicles
- Ships
- Airplanes.

Unless otherwise specified, this drive is intended for installation in a suitable enclosure. The enclosure must protect the drive from exposure to excessive or corrosive moisture, dust and dirt or abnormal ambient temperatures. The exact operating specifications are found in the main installation manual supplied with the drive. The installation, connection and control of drives is a skilled operation, disassembly or repair must not be attempted. In the event that a drive fails to operate correctly, contact the place of purchase for return instructions.

Precautions



WARNING: Do not touch any circuit board, power device or electrical connection before you first ensure that no high voltage is present at this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt to start-up, program or troubleshoot this equipment.



WARNING: Be sure that you are completely familiar with the safe operation and programming of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to program, start-up or troubleshoot this equipment.



WARNING: Be sure the system is properly earthed/grounded before applying power. Do not apply AC power before you ensure that earths/grounds are connected. Electrical shock can cause serious or fatal injury.



WARNING: Improper operation or programming of the drive may cause violent motion of the motor and driven equipment. Be certain that unexpected motor movement will not cause injury to personnel or damage to equipment. Peak torque of several times the rated motor torque can occur during control failure.



WARNING: The motor circuit might have high voltages present whenever AC power is applied, even when the motor is not moving. Electrical shock can cause serious or fatal injury.



CAUTION: To prevent equipment damage, be certain that input and output signals are powered and referenced correctly.



CAUTION: To ensure reliable performance of this equipment be certain that all signals are shielded correctly.

2.1 CAN & Auxiliary I/O option

The CAN & Auxiliary I/O option is available as a factory-fitted option in the Flex+Drive^{II} and MintDrive^{II}. The option adds a number of extra features to the drive:

- 10 extra digital inputs
- 5 extra digital outputs
- CANopen interface
- Baldor CAN interface (MintDrive^{II} only)

The MintDrive^{II} has the ability to act as the network manager node or as a slave. The Flex+Drive^{II} may only act as a slave device.

The presence of the CAN & Auxiliary I/O option can be easily identified by the extra connectors on the front panel of the drive:

- Connector X12, a 25-pin female D-type connector, providing access to the digital I/O
- Connectors X10 and X11, two eight-pin RJ45 sockets providing access to the CAN interface(s)
- Two LEDs for monitoring CAN activity
- DIP switches SW2 for connecting internal termination resistors on the CAN network(s).

The CAN & Auxiliary I/O option is also indicated in the drive's catalog number, which will have the letter B in the last four characters, for example MDH1A05TB-**RB**23, or FPH1A02TB-**EB**23.

The catalog number is marked on the front of the unit, just below the Baldor logo.

2.2 Units and abbreviations

The following units and abbreviations are used in this manual:

CAL CAN Application Layer

CAN Controller Area Network

CiA CAN in Automation group

ISO International Organization for Standards

LED Light Emitting Diode

MintMT The control language used by Baldor drives

WorkBench v5 .. The Windows application software used to setup and program Baldor drives

3.1 Introduction

Connections to the additional inputs and outputs are made using the 25-pin connector X12. Connections to the CAN buses are made using connectors X10 and X11. Additional LEDs are also present on the front panel, labeled CAN. These LEDs show various status conditions of the CAN buses - see section 3.4.5.

3.2 Connector, LED and switch locations

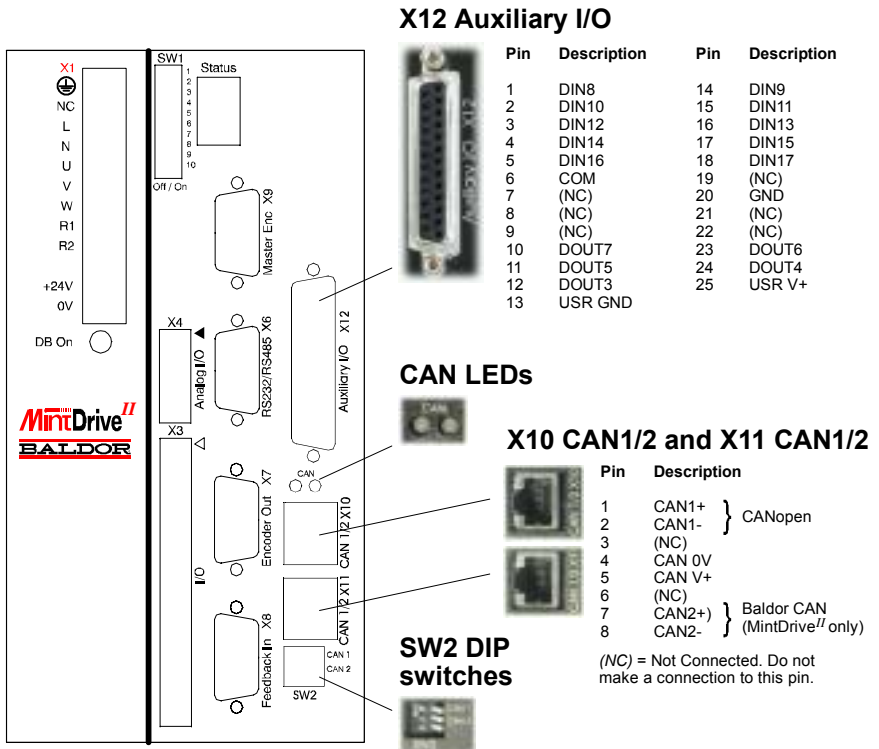


Figure 1 - CAN, Auxiliary I/O, LED and switch locations

3.3 Digital I/O

The option provides additional digital inputs and outputs on connector X12.

3.3.1 Digital inputs - X12



Location	Connector X12	
Pin	Name	MintMT keyword
1	DIN8	INX. 8
2	DIN10	INX. 10
3	DIN12	INX. 12
4	DIN14	INX. 14
5	DIN16	INX. 16
6	COM	-
14	DIN9	INX. 9
15	DIN11	INX. 11
16	DIN13	INX. 13
17	DIN15	INX. 15
18	DIN17	INX. 17
Description	Ten general purpose optically isolated digital inputs. Sampling interval: 2ms Propagation delay: 10µs (maximum, inactive to active) 50µs (maximum, active to inactive)	

The digital inputs DIN8 - DIN17 can be read individually using the associated Mint INX keyword (for example INX. 8) and can be configured for many user definable functions. Each input circuit contains an opto-isolator as shown in Figure 2.

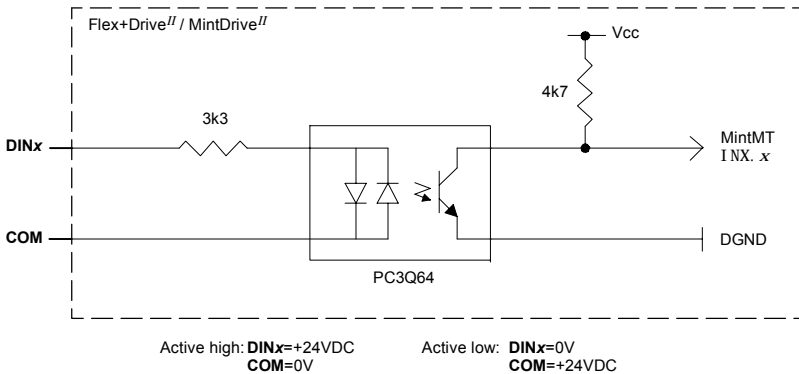


Figure 2 - X12 Digital inputs

3.3.2 COM and digital inputs

The inputs share a single common line COM (pin 6). This controls the sense of all the auxiliary digital inputs and should be permanently wired, dependent on the user requirements:

Active high: connect 0V to pin 6.

The digital inputs will be active when a voltage of 12-24VDC is applied to them and will sink a current of approximately 3-7mA each.

Active low: connect 12-24VDC to pin 6.

The digital inputs will be active when grounded (less than 2V) and will source a current of approximately 3-7mA each.

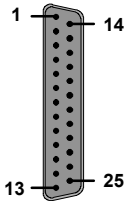
The +24VDC supply is from a customer supplied 24VDC supply that should have a continuous current capability of 1.75A.

The sense of the inputs can be configured in WorkBench v5 or controlled individually in Mint using the keyword `INPUTACTI VELEVEL`.

The use of shielded/screened cable with the shield terminated on the connector backshell is highly recommended and will improve the inputs' noise immunity. The inputs are compatible with mechanical switches or open-collector drivers. They are not, however, compatible with external push-pull drivers unless an external diode is fitted, which effectively converts a push-pull driver into an open collector driver.

There is a maximum hardware propagation delay of 10 μ s between applying an external voltage and the input becoming active (ON). Similarly, there is a maximum delay of 50 μ s for the device to switch OFF when removing an external voltage.

3.3.3 Digital outputs - X12

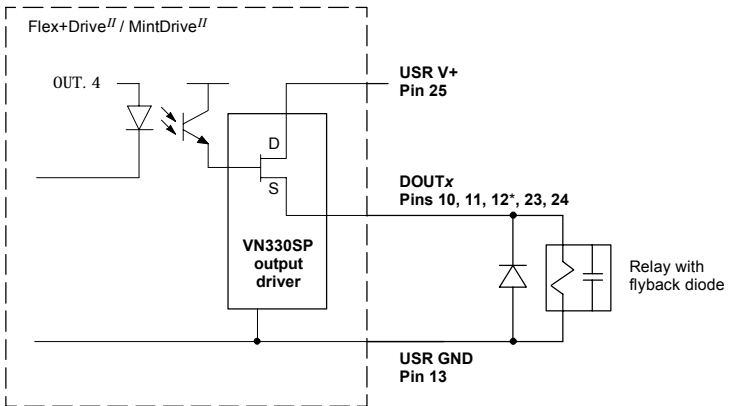


Location	Connector X12	
Pin	Name	MintMT keyword
10	DOUT7	OUTX. 7
11	DOUT5	OUTX. 5
12	DOUT3	OUTX. 3
13	USR GND	-
23	DOUT6	OUTX. 6
24	DOUT4	OUTX. 4
25	USR V+	-
Description	Five general purpose optically isolated digital outputs. Update interval: Immediate.	

These general purpose optically isolated outputs can only be used to source current from the USR V+ rail (pin 25) and return current via the load to USR GND (pin 13). The outputs can be written to directly using the MintMT keyword OUTX (for example OUTX. 4).

Note: The outputs have different current ratings!

DOUT3 is a high current output, rated at a maximum continuous current of 1A. DOUT4 - DOUT7 are lower current outputs, rated at a maximum continuous current of 250mA on each output. There is no minimum current load requirement for DOUT3 - DOUT7.



* To achieve a 1A output, DOUT3 combines the four outputs from a separate VN330SP device.

Figure 3 - X12 Digital output circuit

These MOSFET type outputs are driven from ST VN330SP devices and have a maximum ON resistance of 0.4Ω. There are protection features built into each of the outputs. Under-voltage sensing means that when a USR V+ voltage of less than 10V is applied, the output will become inactive (USR V+ should be in the range +12 to +24VDC). Thermal protection, for short circuit and over dissipation, also causes the output to become inactive.

If the combined current of all the X12 outputs exceeds 5A, there is the possibility of blowing an internal SMD fuse, which is not easily replaceable and is non-serviceable.

If the outputs are used to directly drive a relay or an inductive load, a suitably rated flyback diode must be fitted across the relay coil, observing the correct polarity. This is to ensure that an output is protected from the back-EMF generated from the coil when it is de-energized.

3.3.4 Breakout board for connector X12

Connector X12 can be connected to an I/O break-out board (OPT017-501), providing screw-terminal type connections for all of the digital inputs and outputs, local filtering and LED indicators. The breakout board mounts on a 35mm DIN rail. A 2m (6ft) shielded connecting cable CBL022-501 may be ordered.

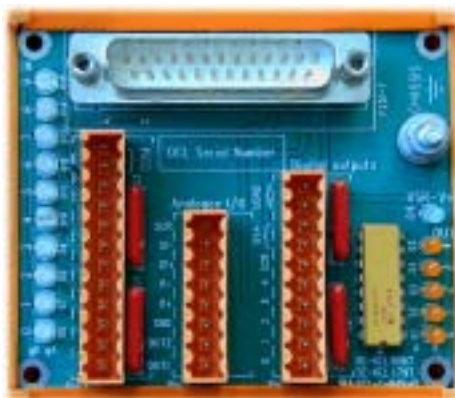


Figure 4 - Auxiliary I/O breakout board

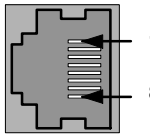
Note: The 'Analogue I/O' connector is provided for use with other Baldor products. It is not used when the breakout board is connected to the CAN & Auxiliary I/O option.

3.4 CAN

The CAN & Auxiliary I/O option provides one CANopen channel. An additional Baldor CAN channel is available on the MintDrive^{II} only. CAN offers very reliable serial communications over a two wire twisted pair cable. In an industrial environment, the probability of an undetected error is 4.7×10^{-11} . CAN also offers high speed data transfer (up to 1Mbit/s, dependent on bus length) and low cost multiplex wiring schemes. CAN is optimized for the transmission of small data packets and therefore offers fast update of I/O devices (peripherals) connected to the bus. The CANopen network allows 127 CANopen peripheral devices to be attached to the same controller.

The CAN & Auxiliary I/O option provides access to CANopen (CAN1) and Baldor CAN (CAN2) buses on identical connectors X10 and X11. Both buses are available on both connectors to simplify “daisy-chaining” of peripherals.

3.4.1 CAN connectors - X10 and X11



Location			Connectors X10 / X11		
Pin	Name	Description	Pin	Name	Description
1	CAN1+	CANopen	1	CAN1+	CANopen
2	CAN1-	CANopen	2	CAN1-	CANopen
3	-	(NC)	3	-	(NC)
4	CAN 0V	Ground/earth reference for CAN signals	4	CAN 0V	Ground/earth reference for CAN signals
5	CAN V+	CAN remote node power V+ (12-24V)	5	CAN V+	CAN remote node power V+ (12-24V)
6	-	(NC)	6	-	(NC)
7	CAN2+	Baldor CAN (MintDrive ^{II} only)	7	CAN2+	Baldor CAN (MintDrive ^{II} only)
8	CAN2-	Baldor CAN (MintDrive ^{II} only)	8	CAN2-	Baldor CAN (MintDrive ^{II} only)
Description			First CAN interface using a RJ45 connector.		

Correct operation of CAN can only be achieved with screened/shielded twisted-pair cabling. CAN1+ / CAN1- and CAN2+ / CAN2- must form twisted pairs with the shield connected to the connector backshell, as shown in Figure 5. A range of suitable CAN cables are available from Baldor, with catalog numbers beginning CBL004-5...

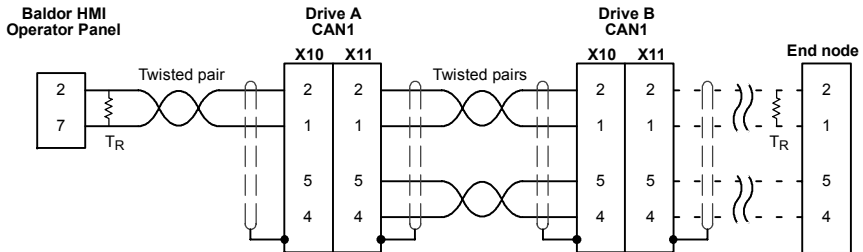


Figure 5 - Typical CAN network connections

3.4.2 CANopen

CANopen is a networking system based on the serial bus CAN. It uses the international CAN standard ISO 11898 as the basis for communication. The Mint firmware implements a CANopen protocol on CAN bus 1, based on the 'Communication Profile' CiA DS-301, which supports both direct access to device parameters and time-critical process data communication. This provides support for a range of Baldor and third-party devices.

The CANopen channel is opto-isolated and available on connectors X10 and X11. Voltages of 12-24V may be applied to pin 5 of X10 and X11. An internal voltage regulator provides the 5V required for the isolated CAN circuit.

Practical operation of this CANopen channel is limited to 500Kbit/s owing to the propagation delay of the opto-isolators.

CAN1 must be terminated by a 120Ω resistor connected between CAN1+ and CAN1- at both ends of the network and nowhere else. If the drive is at the end of the network then ensure that the SW2 CAN1 DIP switch (located on the front panel) is in the On position, which will connect an internal terminating resistor.

The MintDrive^{II} has the ability to act as the network manager node or as a slave on the CANopen network. The Flex+Drive^{II} may only act as a slave device.

3.4.3 Baldor CAN (MintDrive^{II} only)

Baldor CAN is also a networking system based on the serial bus CAN. It uses the international CAN standard ISO 11898 as the basis for communication. The MintMT firmware implements a proprietary Baldor protocol on CAN bus 2, based on CAL, which supports both direct access to device parameters and time-critical process data communication. This provides support for the full range of Baldor ioNode CAN peripherals.

The Baldor CAN channel is available on X10 and X11. It is not opto-isolated and will operate at baud rates up to 1000Kbit/s.

CAN2 must be terminated by a 120Ω resistor connected between CAN2+ and CAN2- at both ends of the network and nowhere else. If the drive is at the end of the network then ensure that the SW2 CAN2 DIP switch (located on the front panel) is in the On position, which will connect an internal terminating resistor.

On the ioNode unit, jumpers JP1 and JP2 must be in the CAN Bus 2 position to select pins 7 & 8 for CAN traffic.

3.4.4 SW2 DIP switches

On ←→ Off



The CAN 1 (CANopen) and CAN 2 (Baldor CAN) DIP switches can be used to connect internal termination resistors.

When a switch is in the On position, the internal termination resistor is connected on the corresponding CAN bus.

Switch 3 has no purpose.

3.4.5 CAN LEDs



The CAN LED on the left shows activity on the CAN1 (CANopen) bus. The CAN LED on the right shows activity on the CAN2 (Baldor CAN) bus.

Each LED is a bi-color device (can appear green or red), and can have the following states:

Color	Meaning
Green	The bus is operational. This indicates that the CAN controller has not detected a number of errors greater than the 'Passive' threshold (127 errors).
Red (flashing)	The bus is passive. This indicates that the CAN controller is experiencing a number of Tx or Rx errors, greater than the 'Passive' threshold (127 errors). See Appendix A.
Red	The bus is OFF. This indicates that the CAN controller has experienced a fatal number of errors (255 errors) and has switched itself into a state whereby it cannot influence the bus. See Appendix A.
Off	No primary power to the option.

A.1 Specifications

A.1.1 Digital inputs (X3)

Item	Unit	Value
Type	VDC	Opto-isolated DC inputs
Input voltage (active) Maximum Minimum	VDC	±28 ±12
Input voltage (inactive) Maximum Nominal	VDC	±2 0
Input current (approximate, per input)	mA	3 - 7
Sampling interval	ms	2
Hardware propagation delay inactive to active active to inactive	µs	10 50

A.1.2 Digital outputs (X3)

Item	Unit	Value
Output current (maximum, each output) DOUT3 DOUT4 - DOUT7	mA	1000 250
Update interval		Immediate

A.1.3 CAN Bus interfaces (X10 & X11)

Item	Unit	Value
Signal	-	2-wire, isolated
Channels	-	2
Protocols	-	CAN bus 1: CANopen CAN bus 2: Baldor CAN
Bit rates CANopen Baldor CAN	Kbit/s	10, 20, 50, 100, 125, 250, 500 10, 20, 50, 125, 250, 500, 800, 1000

A.1.4 CAN wiring

A very low error rate over CAN can only be achieved with a suitable wiring scheme, so the following points should be observed:

- CAN must be connected via twisted pair cabling to reduce RF emissions and provide immunity to conducted interference. The connection arrangement is normally a simple multi-point drop. The CAN cables should have a characteristic impedance of 120Ω and a delay of 5ns/m. Other characteristics depend upon the length of the cabling:

Cable length	Maximum bit rate	Resistance	Conductor area
0m - 40m (0ft - 131ft)	1000Kbit/s	<70mΩ/m	0.25 - 0.34mm ²
40m - 300m (131ft - 984ft)	500Kbit/s	<60mΩ/m	0.34 - 0.60mm ²
300m - 600m (984ft - 1968ft)	100Kbit/s	<40mΩ/m	0.50 - 0.60mm ²
600m - 1000m (1968ft - 3280ft)	50Kbit/s	<26mΩ/m	0.75 - 0.80mm ²

- Terminators must only be fitted at each end of the network, not at intermediate nodes.
- The 0V rails of all of the nodes on the network must be tied together through the CAN cabling. This ensures that the CAN signal levels transmitted by the drive or CAN peripheral devices are within the common mode range of the receiver circuitry of other nodes on the network.

B.1 Operation

The MintDrive^{II} has the ability to act as the network manager node or as a slave on a CAN network. The Flex+Drive^{II} may only act as a slave device.

Both drives have a data array that is accessible by external devices over CANopen. This array, known as the COMMS array, has 99 user elements for data exchange. A further 155 read-only elements are available which contain data such as position and I/O states.

B.1.1 Making a connection

When a MintDrive^{II} is acting as a network manager node (node 1), it scans the CANopen network for other nodes. If it detects another Baldor device, for example a Flex+Drive^{II}, it will automatically make a connection. The device now becomes an operational slave on the network, and the master may read and write data to its COMMS array.

The MintMT keyword CONNECT is normally used to make connections. Therefore, when the master *automatically* connects to a slave device, it uses a command equivalent to:

```
CONNECT. 1. 5 = 1
```

where the initial 1 is the master's node number and 5 is the node number of the detected slave (for example). The final 1 indicates that the connection is to be made; zero is used to break a connection. For full details of CONNECT and other related keywords, see the MintMT help file.

B.1.2 Peer-to-peer connections

If a peer-to-peer connection is required, where the slave device is allowed to read and write data to the master's COMMS array, a manual connection must be made. The command required to make this connection can only be issued from the master, which retains overall control of the network. Continuing the example in B.1.1, the command:

```
CONNECT. 5. 1 = 1
```

could be issued from the master to enable the slave to access the master's COMMS array.

B.1.3 COMMS and BUS Events

A drive's MintMT program can use *Events* to detect changes to any of the first five COMMS elements (1-5). An Event must be defined for each location to be monitored. For example, to detect changes to comms location 3, Event COMMS3 must be defined:

```
Event COMMS3
  . . . 'statements
End Event
```

Similarly, Events called BUS1 (for CANopen) and BUS2 (for Baldor CAN) can be used to detect events occurring on the CAN buses. For example:

```
Event BUS1
... statements
End Event
```

The BUS Events can be used to capture many events such as nodes becoming live or dead, or a bus becoming operational.

Events are monitored continuously and have a high priority, allowing a MintMT program to react quickly to changes in a drive's COMMS locations or events occurring on the CAN buses.

For full details and examples of Events, see the MintMT help file.

B.2 Troubleshooting CAN

Use this section to troubleshoot problems involving CAN. For more information about CAN networks, MintMT keywords and error messages, see the MintMT help file.

Problem	Check
The CAN1 LED is illuminated red	<p>The CAN1 bus is off. This means that the CAN controller has experienced a fatal number of errors (255 errors) and has switched itself into a state whereby it cannot influence the bus.</p> <ol style="list-style-type: none"> 1) Check the CAN cable is not broken or disconnected. 2) Check that all nodes are running at the same baud rate. 3) Try using the BUSRESET. 1 command to reset the bus.
The CAN1 LED is flashing red	<p>The CAN1 bus is passive. This means that the CAN controller is experiencing a number of Tx or Rx errors, greater than the 'Passive' threshold (127 errors).</p> <ol style="list-style-type: none"> 1) Check the CAN cable is not broken or disconnected. 2) Check that all nodes are running at the same baud rate. 3) Check that each node has been assigned a unique NodeID. The master must be assigned NodeID #1. 4) Check that the network has been terminated at each end. If the drive is at the end of the network, check that the CAN1 switch on the front panel is in the ON position. 5) Try using the BUSRESET. 1 command to reset the bus.
The CAN1 LED is green but communication with a node is not possible.	<p>When the drive scans the CANopen network and detects another Baldor device, it will automatically make a connection. However, if the device is not a Baldor product it will be necessary to make the connection manually. Assuming WorkBench v5 is connected to the drive, use the command:</p> <p>CONNECT. 1. $n = 1$</p> <p>where the initial 1 is the drive's node number (the master) and n is the node number of the peripheral device. This should put the device into its operational state, allowing communication.</p>
The CAN2 LED is illuminated red.	<p>The CAN2 bus is off. This means that the CAN controller has experienced a fatal number of errors (255 errors) and has switched itself into a state whereby it cannot influence the bus.</p> <ol style="list-style-type: none"> 1) Check the CAN cable is not broken or disconnected. 2) Check that all nodes are running at the same baud rate. 3) Try using the BUSRESET. 2 command to reset the bus.

Problem	Check
The CAN2 LED is flashing red.	<p>The CAN2 bus is passive. This means that the CAN controller is experiencing a number of Tx or Rx errors, greater than the 'Passive' threshold (127 errors).</p> <ol style="list-style-type: none"> 1) Check the CAN cable is not broken or disconnected. 2) Check that all nodes are running at the same baud rate. 3) Check that each node has been assigned a unique NodeID. 4) Check that the network has been terminated at each end. If the drive is at the end of the network, check that the CAN2 switch on the front panel is in the ON position. JP3 should be fitted on the Baldor CAN node at the other end of the network. 5) Check that the jumpers on each CAN peripheral are in the correct position. JP1 and JP2 should be set for bus 2. 6) Try using the BUSRESET. 2 command to reset the bus.
The master device reports that a node has died	<p>The master sends periodic node guarding messages to check that each node on a CAN network is operating correctly ('live'). The slave must respond to the message within a specified period. Sometimes a node may unexpectedly be reported as 'dead':</p> <ol style="list-style-type: none"> 1) Confirm that the CAN bus is not being overloaded. This can sometimes happen on large networks with multiple nodes. Excessive network 'traffic' can prevent the master from receiving the slave's response within the specified period. A CAN analysis tool may be required to determine this problem. 2) If a slave is operating in a peer-to-peer configuration with another slave (communicating directly, independently of the master) check that their communications do not prevent them responding to the master's node guarding messages.

C.1 Description

The following table lists the objects supported on the CANopen bus. These conform to the DS-301 specification, unless otherwise indicated. The columns have the following meanings:

Index	The address of the named item, expressed as a hexadecimal value.
Name	The name of the item.
Code	The format of the data, where: VAR = single data field of a pre-defined variable type. ARRAY = multiple data field where each field is of the same variable type. RECORD = multiple data field where each field can be of any variable type.
Type	Specifies the type of the Object Dictionary item, for example BOOLEAN, FLOAT or UNSIGNED.
Attribute	Defines the access rights for the Object Dictionary item: RW = Read and Write access. RO = Read Only access. Const = Read Only access and value is constant.

Index (hex)	Name	Code	Type	Attribute
1000	Device type	VAR.	UNSIGNED 32	RO
1001	Error register	VAR.	UNSIGNED 8	RO
1002	Manufacturer status register	VAR.	UNSIGNED 32	RO
1003	Pre-defined error field	ARRAY	UNSIGNED 32	RO
1005	COB-ID SYNC	VAR.	UNSIGNED 32	RW
1006	Communication cycle period	VAR.	UNSIGNED 32	RW
1007	Synchronous window length	VAR.	UNSIGNED 32	RW
100C	Guard time	VAR.	UNSIGNED 16	RW
100D	Lifetime factor	VAR.	UNSIGNED 8	RW
1014	COB-ID emergency	VAR.	UNSIGNED 32	RW
Server SDO Parameters				
1200	1st Server SDO parameter	RECORD	SDO Parameter (22h)	RO
}				
127F	128th Server SDO parameter	RECORD	SDO Parameter (22h)	RW

Index (hex)	Name	Code	Type	Attribute
Client SDO Parameters				
1280	1st Client SDO parameter	RECORD	SDO Parameter (22h)	RW
}				
12FF	128th Client SDO parameter	RECORD	SDO Parameter (22h)	RW
Receive PDO Communication Parameters				
1400	1st Receive PDO parameter	RECORD	PDO CommPar (20h)	RW
}				
14FF	255th Receive PDO parameter	RECORD	PDO CommPar (20h)	RW
Group Receive PDO Communication Parameters				
1500	1st Group Receive PDO parameter	RECORD	PDO CommPar (20h)	RW
}				
1509	10th Group Receive PDO parameter	RECORD	PDO CommPar (20h)	RW
Transmit PDO Communication Parameters				
1800	1st Transmit PDO parameter	RECORD	PDO CommPar (20h)	RW
}				
18FF	255th Transmit PDO parameter	RECORD	PDO CommPar (20h)	RW
Group Transmit PDO Communication Parameters				
1900	1st Group Transmit PDO parameter	RECORD	PDO CommPar (20h)	RW
}				
1909	10th Group Transmit PDO parameter	RECORD	PDO CommPar (20h)	RW
Program Download				
1F50	Download Program Data	ARRAY	Domain	RW
1F51	Program Control	VAR.	UNSIGNED 8	RW

Index (hex)	Name	Code	Type	Attribute
Manufacturer Specific				
2000	Comms array	ARRAY	UNSIGNED 32	RW
2100	Remote node type	ARRAY	UNSIGNED 8	RW
2101	Remote node TX1 PDO	ARRAY	UNSIGNED 8	RW
2102	Remote node RX1 PDO	ARRAY	UNSIGNED 8	RW
2103	Remote node TX2 PDO	ARRAY	UNSIGNED 8	RW
2104	Remote node RX2 PDO	ARRAY	UNSIGNED 8	RW
2105	Remote node server SDO	ARRAY	UNSIGNED 8	RW
2106	Remote node client SDO	ARRAY	UNSIGNED 8	RW
2107	Remote node digital output bytes	ARRAY	UNSIGNED 8	RW
2108	Remote node digital input bytes	ARRAY	UNSIGNED 8	RW
Digital Input Module (DS-401)				
6000	Read state 8 input lines	ARRAY	UNSIGNED 8	RO
Digital Output Module (DS-401)				
6200	Write state 8 output lines	ARRAY	UNSIGNED 8	RW
Analog Input Module (DS-401)				
6423	Analog input global interrupt enable	VAR.	BOOLEAN	RW
6426	Analog input interrupt delta	ARRAY	UNSIGNED 32	RO
Baldor HMI Module (DS-403)				
6700	Read input variable unsigned32	RECORD	UNSIGNED 32	RO
7100	Read input variable float	RECORD	FLOAT	RO
8100	Write output variable unsigned32	RECORD	UNSIGNED 32	RW
8500	Write output variable float	RECORD	FLOAT	RW

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