

Ethernet/IP

Communications option
for EMX4e/EMX4i soft starters

User Guide



BENSHAW

Applied Motor Controls

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Product Compatibility

This expansion card is suitable for use with EMX4e and EMX4i soft starters.

Product description	Soft starter name
Basic model	EMX4e
Advanced model	EMX4i

Parameter Management

Parameter lists vary according to the model and version of soft starter.

Refer to the relevant soft starter literature for a complete parameter list.

For the latest manuals and software, please visit our website.

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1 Disclaimer

The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or

2 Warnings



WARNING

For your safety, isolate the soft starter from mains voltage before attaching or removing accessories.



WARNING

Inserting foreign objects or touching the inside of the starter while the expansion port cover is open may endanger personnel, and can damage the starter.

3 Important User Information

Observe all necessary safety precautions when controlling the soft starter remotely. Alert personnel that machinery may start without warning.

It is the installer's responsibility to follow all instructions in this manual and to follow correct electrical practice.

3.1 Product Design

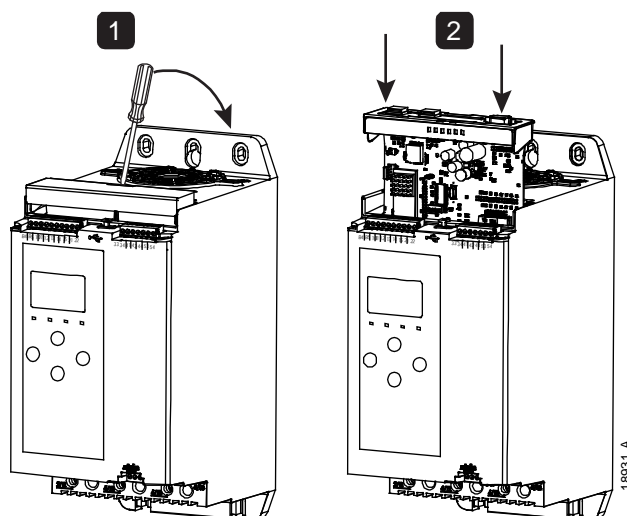
The Ethernet/IP Card allows the soft starter to connect to an Ethernet network and be controlled or monitored using an Ethernet communication model.

Familiarity with Ethernet protocols and networks is required to operate the device successfully. For difficulties using this device with third party products, including PLCs, scanners and commissioning tools, contact the relevant supplier.

4 Installation

4.1 Installing the Expansion Card

1. Push a small flat-bladed screwdriver into the slot in the centre of the expansion port cover, and ease the cover away from the starter.
2. Line up the card with the expansion port. Gently push the card along the guide rails until it clicks into the starter.



4.2 Network Connection

Ethernet Ports

The device has two Ethernet ports. If only one connection is required, either port can be used.

Cables

Use Category 5, 5e, 6 or 6e cable to connect to the device.

EMC Precautions

To minimise electromagnetic interference, Ethernet cables should be separated from motor and mains cables by 200 mm.

If the Ethernet cable must cross motor or mains cables, the crossing should be at an angle of 90°.

4.3 Network Establishment

The controller must establish communications directly with each device before the device can participate in the network.

4.4 Addressing

Each device in a network is addressed using a MAC address and an IP address.

- The device can be assigned a static IP address during configuration, or can be configured to accept a dynamic IP address (via DHCP).
- The MAC address is fixed within the device and is printed on a label on the front of the device.

5 Device Configuration



NOTE

The Error LED flashes whenever the device is receiving power but is not connected to a network. The Error LED will flash occasionally during the configuration process.

5.1 Configuration Methods

Network communication parameters for the card should be set via the soft starter (via the Main Menu or by uploading a configuration file via USB Save & Load).

- If physical access to the starter is not possible, Ethernet attributes can be configured directly in the card using the on-board web server. The default address for a new card is 192.168.0.2. The default subnet mask is 255.255.255.0. The web server will only accept connections from within the same subnet domain. Changes made via the on-board web server are not stored permanently and will be lost when control power is cycled.
- If the subnet domain of the card is different from the controller, or if the IP address has been changed and is no longer known, use the Ethernet Device Configuration Tool to scan the network and identify the device. Changes made via the Ethernet Device Configuration Tool cannot be stored permanently in the device and will be lost when control power is cycled.

5.2 Configure Network Settings via the Starter

Use parameters 12H~12U to configure the network address.

Parameter	Parameter name	Default
12H	<i>Gateway Address</i>	192
12I	<i>Gateway Address 2</i>	168
12J	<i>Gateway Address 3</i>	0
12K	<i>Gateway Address 4</i>	100
12L	<i>IP Address</i>	192
12M	<i>IP Address 2</i>	168
12N	<i>IP Address 3</i>	0
12O	<i>IP Address 4</i>	2
12P	<i>Subnet Mask</i>	255
12Q	<i>Subnet Mask 2</i>	255
12R	<i>Subnet Mask 3</i>	255
12S	<i>Subnet Mask 4</i>	0
12T	<i>DHCP</i>	Disable
12U	<i>Location ID</i>	0

5.3 Enabling Network Control

The soft starter will only accept commands from the Ethernet/IP Card if parameter 1A *Command Source* is set to 'Network'.



NOTE

If the reset input is active, the starter will not operate. If a reset switch is not required, use parameter 7I to set the reset input to normally open or fit a link across terminals 10, 11 on the soft starter.

5.4 On-board Web Server

To configure settings using the on-board web server, the card must be installed in a soft starter, control power must be available, and the card and computer must both be connected to the Ethernet network.



NOTE

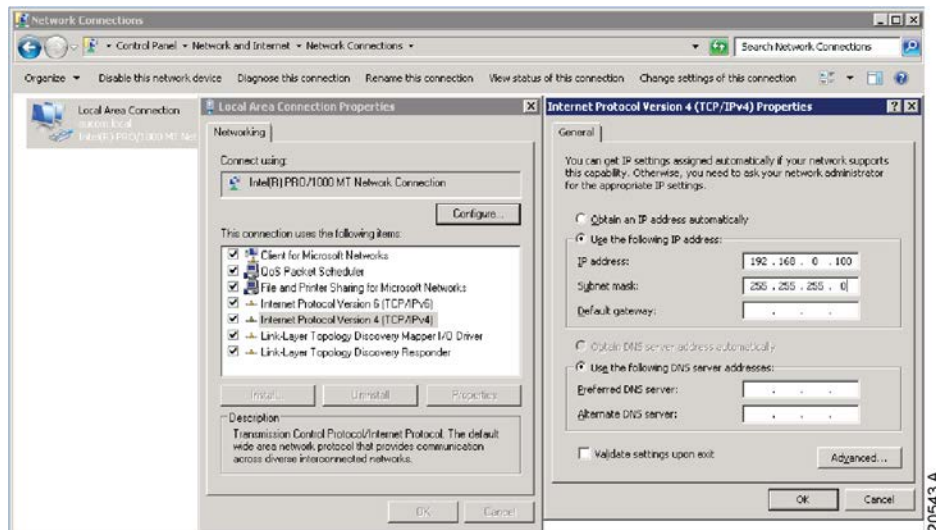
If prompted to enter a username and password:

username: admin

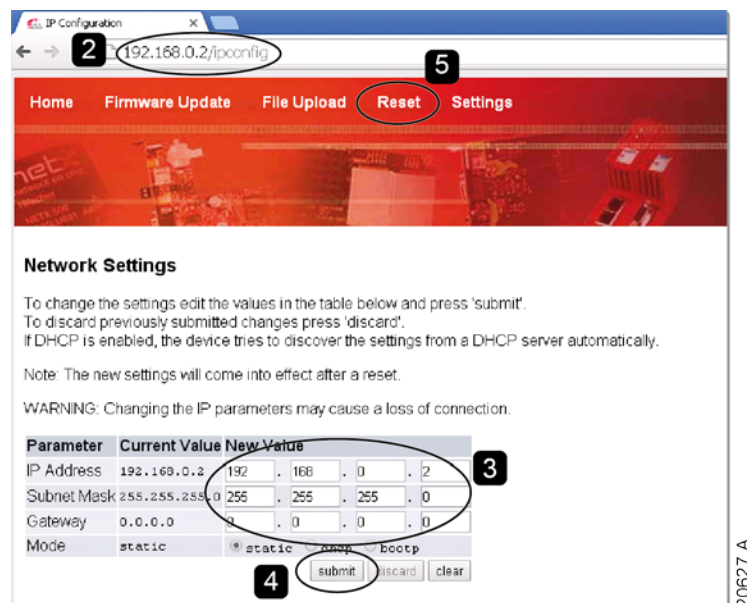
password: admin

To configure the device using the on-board web server:

1. The network adapter settings on the computer must be fixed IP address (not DHCP) and the same subnet as the card. The default subnet mask is 255.255.255.0.



2. Start a browser and enter the device address, followed by /ipconfig. The default address for a new card is 192.168.0.2.



3. Edit the settings as required.
4. Click "Submit" to send the new settings to the device.
5. Click "Reset" then follow the on-screen instructions to activate the settings in the device.

NOTE: Changes made via the on-board web server are not stored permanently and will be lost when control power is cycled.

**NOTE**

If you change the subnet mask, the web server will not be able to communicate with the device after the new settings are saved.

**NOTE**

Changing the IP address via the web server does not change the address settings saved in the soft starter.

5.5 Ethernet Device Configuration Tool

Use the Ethernet Device Configuration Tool to connect to the device if you do not know the IP address, or if the subnet mask of the web server does not match.

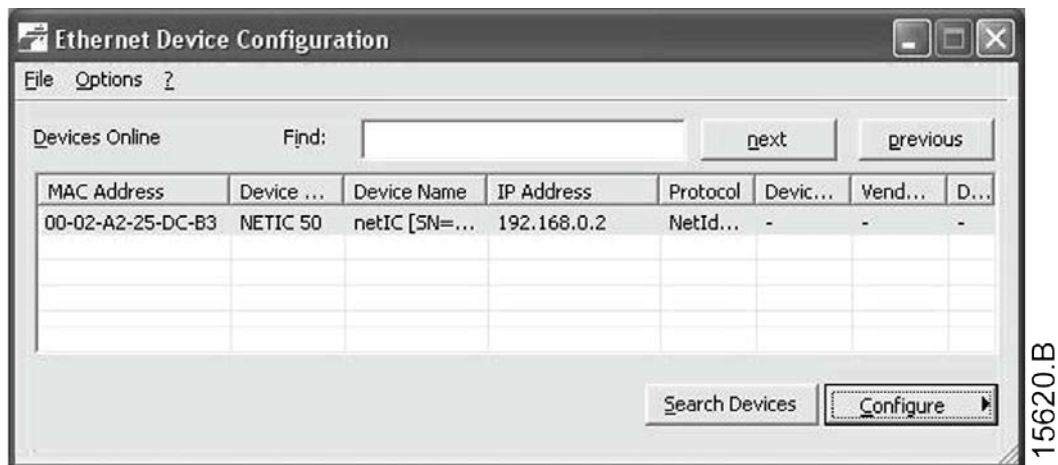
The Ethernet Device Configuration Tool is available from your local supplier.

**NOTE**

If your PC has a firewall enabled, you must add the tool to the list of authorised programs.

To identify the device using the Ethernet Device Configuration Tool:

1. Start the Ethernet Device Configuration Tool.
2. Click on Search Devices. The software will search for connected devices.



3. Use the IP address to connect to the device via the web server.

6 Scanner Configuration

6.1 EDS File

An EDS file that contains all required attributes of the device is available from your supplier. Once the EDS file has been loaded, the individual device must be defined.

6.2 Assembly Objects

The device supports two assembly objects.

Description	Class	Instance	Type	Maximum Size
Output (scanner -> starter)	04d (0x04)	100d (0x64)	Integer	2 (4 bytes)
Input (starter -> scanner)	04d (0x04)	101d (0x65)	Integer	6 (12 bytes)

7 Operation

The Ethernet/IP Card is conformance tested to ODVA. For successful operation, the scanner must also support all functions and interfaces described in this document.



NOTE

The available features and parameter details may vary according to the model and software version of the starter. Refer to the soft starter user manual for details of parameters and supported features.

7.1 Device Classification

The Ethernet/IP Card is an I/O Adapter and must be managed by an I/O Scanner over Ethernet.

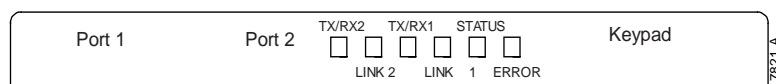
The Ethernet/IP Card supports both implicit (cyclic) and explicit (acyclic) messaging.

7.2 Ensuring Safe and Successful Control

Data written to the device will remain in its registers until the data is overwritten or the device is reinitialised.

If the soft starter may be controlled via Command Override (parameter 7A) or may be disabled via the reset input (terminals 10, 11) fieldbus commands should be cleared from the registers. If a command is not cleared, it will be re-sent to the starter once fieldbus control resumes.

7.3 Feedback LEDs



LED name	LED Status	Description
Error	Off	Device is not powered up or has received an IP address.
	Flashing	Connection timeout.
	On	Duplicate IP address.
Status	Off	Device is not powered up or does not have an IP address.
	Flashing	Device has obtained an IP address but has not established any network connections.
	On	Communication has been established.
Link x	Off	No network connection.
	On	Connected to a network.
TX/RX x	Flashing	Transmitting or receiving data.

8 Implicit Messaging (Cyclic Operation)

This section lists requirements related to cyclic (implicit messaging) services for the Ethernet/IP Card.

The minimum cyclic interval is 1 ms.

All data is in little endian format.

8.1 Assembly Objects

The device supports two assembly objects.

Description	Class	Instance	Type	Maximum Size
Output (scanner -> starter)	04d (0x04)	100d (0x64)	Integer	2 (4 bytes)
Input (starter -> scanner)	04d (0x04)	101d (0x65)	Integer	6 (12 bytes)

8.2 Control Commands (Assembly Instance 100d)

To send control data from the scanner to the starter, use assembly class 04d (0x04), assembly instance 100d (0x64), attribute 03d (0x03).

Bytes 0-1: Command

Bits	Function	Details
0 to 5	<i>Reserved</i>	Must be zero
6	Run	0 = Stop command 1 = Start command
7	Reset	Changing this bit from 0 to 1 will reset a trip.
8 to 12	<i>Reserved</i>	Must be zero
13	Motor set select	0 = Use primary motor set when starting 1 = Use secondary motor set when starting
14 to 15	<i>Reserved</i>	Must be zero

Bytes 2-3: Reserved

Bits	Function	Details
0 to 15	<i>Reserved</i>	Must be zero

Command Examples

Byte	Value	Description
0	0b01000000 (64d, 0x40)	Command: Start the soft starter
1	0b00000000 (00d, 0x00) or 0b00100000 (32d, 0x20)	Command: Select primary or secondary motor settings Use primary motor set when starting. Use secondary motor set when starting.
0	0b10000000 (128d, 0x80)	Command: Reset the soft starter The reset only occurs when the previous reset bit is zero, otherwise the value of 1 will be ignored.
0	0b11000000 (192d, 0xC0)	Command: Reset and start the soft starter
0	0bX0000000 (00d, 0x00)	Command: Stop the soft starter

8.3 Status Information (Assembly Instance 101d)

To retrieve status data from the starter, use assembly class 04d (0x04), assembly instance 101d (0x65), attribute 03d (0x03).

Bytes 0-1: Starter state

Bits	Function	Details
0	Ready	0 = Not ready 1 = Ready to start
1	Operating mode	0 = Program mode 1 = Operating mode
2	Running	0 = Not ready, Ready to start or Tripped 1 = Starting, Running, Stopping or Jogging
3	Trip	0 = Not tripped 1 = Tripped
4	Jog forward	1 = Jog forward
5	Jog reverse	1 = Jog reverse
6	<i>Reserved</i>	
7	Warning	0 = No warning 1 = Warning
8	Ramping	1 = Running (full voltage at the motor)
9	Command source	0 = Remote Keypad, Digital Input, Clock 1 = Network
10	<i>Reserved</i>	
11	<i>Reserved</i>	
12	<i>Reserved</i>	
13	<i>Reserved</i>	
14	<i>Reserved</i>	
15	Temperature limit	0 = Motor operating within thermal capacity (thermal model) 1 = Motor operating above thermal capacity (thermal model)

Bytes 2-3: Reserved

Bits	Function	Details
0 to 15	<i>Reserved</i>	

Bytes 4-7: Motor current

Bits	Function	Details
0 to 31	Motor current	Average rms current across all three phases. Measured current is represented as a 32-bit value to 2 decimal places. 10d (0x0A) = 0.10 A 3450d (0xD7A) = 34.50 A 68930d (0x10D42) = 689.30 A

Bytes 8-9: Trip code

Bits	Function	Details
0 to 15	Trip code	See <i>Trip Codes</i> on page 12.

Bytes 10-11: Reserved

Bits	Function	Details
0 to 15	<i>Reserved</i>	

9 Explicit Messaging (Acyclic Operation)

This section provides information on objects, instances, attributes and services for acyclic operation (explicit messaging).

All data is in little endian format.

9.1 Identity Object (Class 0x01)

The Ethernet/IP Card supports the following attributes for identity objects:

Attribute	Function	Value
1	Vendor	204d (0xCC)
2	Device type	12d (0x0C)
3	Product code	269d (0x10D)
4	Revision: Major, Minor	EDS file version
5	Status	Supported
6	Serial number	Supported
7	Product name	Supported

9.2 Vendor-specific Objects

The Ethernet/IP Card supports vendor-specific classes 100, 101, 103 and 104.

Class 100 and 101 Objects (Read/Write)

Class 100 and 101 objects allow parameter values to be read from and written to the soft starter.

- Class 100d (0x604): parameters 1~99
- Class 101d (0x65): parameters 100~199

See *Parameter Lists* on page 14 for details.

Class 103 Objects (Read Only)

Class 103d (0x67) allows starter state information to be read from the soft starter.

**NOTE**

For models 0064B and smaller, current reported via communications is 10 times greater than the actual value (displayed on the keypad).

Object Name	Class	Instance	Attribute
Binary protocol version	103	100	100
Product type code	103	101	100
<i>Reserved</i>	103	102	100
<i>Reserved</i>	103	103	100

Object Name	Class	Instance	Attribute
Soft starter model	103	104	100
Changed parameter number	103	105	100
Num Parameters	103	106	100
Changed parameter value	103	107	100
<i>Reserved</i>	103	108	100
Starter state 1 = Ready 2 = Starting 3 = Running 4 = Stopping (including braking) 5 = Restart delay (including temperature check) 6 = Tripped 7 = Programming mode 8 = Jog forward 9 = Jog reverse	103	109	100
Warning 1 = Warning, 0 = No warning	103	110	100
Initialised 1 = Phase sequence is valid	103	111	100
Phase sequence (1 = Positive phase sequence, only valid if Initialised =1)	103	112	100
<i>Reserved</i>	103	113	100
<i>Reserved</i>	103	114	100
Trip/Warning code (see <i>Trip Codes</i> on page 12)	103	115	100
Average rms current across all three phases	103	116	100
Current (% motor FLC)	103	117	100
Motor temperature	103	118	100
<i>Reserved</i>	103	119	100
Power	103	120	100
Power scale 0 = Multiply power by 10 to get W 1 = Multiply power by 100 to get W 2 = Power (kW) 3 = Multiply power by 10 to get kW	103	121	100
% Power factor	103	122	100
Average rms voltage across all three phases	103	123	100
Phase 1 current	103	124	100
Phase 2 current	103	125	100
Phase 3 current	103	126	100
Phase 1 voltage	103	127	100
Phase 2 voltage	103	128	100
Phase 3 voltage	103	129	100
Parameter list minor revision	103	130	100
Parameter list major version	103	131	100

Object Name	Class	Instance	Attribute
Digital input state For all inputs, 0 = open, 1 = closed (shorted) Start/stop input = 01h, Reset = 04h, Programmable input A = 08h, Programmable input B = 10h	103	132	100

Class 104 Objects (Read Only)

Class 104d (0x68) allows extended information to be read from the soft starter.

Object Name	Class	Instance	Attribute
Major Software Version – User interface	104	101	100
Minor Software Version – User interface	104	102	100
Major Software Version – Motor control	104	103	100
Minor Software Version – Motor control	104	104	100
Major Software Version – Remote keypad (if installed)	104	105	100
Minor Software Version – Remote keypad (if installed)	104	106	100
Major Software Version – Expansion card (if installed)	104	107	100
Minor Software Version – Expansion card (if installed)	104	108	100

9.3 Supported Services for Vendor-specific Objects

This section describes the operational instructions to carry out acyclic services on class objects 100, 101, 103 and 104.

Service Codes for Acyclic Operation

The device supports the following services for vendor-specific objects:

Service Code	Function	Description
01d (0x01)	Get Attribute All	Only supported for class 0x01 identity object
10d (0x10)	Set Attribute Single	Supported
15d (0x0E)	Get Attribute Single	Supported

Service Codes for Acyclic Operation

The device will return the following status codes in response to Get/Set Attribute Single:

Status code	Status name	Details
00d (0x00)	Success	This code is returned when: <ul style="list-style-type: none"> the register mapped for service 'Get Attribute Single' is successfully read the register mapped for service 'Set Attribute Single' is successfully set
03d (0x03)	Invalid parameter value	
05d (0x05)	Path destination unknown	The mapped register does not exist.
08d (0x08)	Service not supported	The requested service is not available for this Object Class/Instance.

Status code	Status name	Details
09d (0x09)	Invalid attribute value	This code only applies to the service 'Set Attribute Single'. It is returned if the value is out of range for the mapped register.
15d (0x0E)	Attribute not settable	This code only applies to the service 'Set Attribute Single'. It is returned if the mapped register is read-only.
20d (0x14)	Attribute not supported	The attribute specified in the request is not supported.
22d (0x16)	Object does not exist	The object specified does not exist in the device.

10 Attributes

10.1 Trip Codes

Code	Trip Type
0	No trip
11	Input A trip
20	Motor overload
21	Heatsink overtemperature
23	L1 phase loss
24	L2 phase loss
25	L3 phase loss
26	Current imbalance
28	Overcurrent
29	Undercurrent
50	Power loss
51	Undervoltage
52	Overvoltage
54	Phase sequence
55	Frequency
60	Incorrect control card
61	FLC out of range
62	EEPROM fail (Parameter out of range)
75	Motor thermistor
101	Excess start time
102	Motor connection
104	Internal fault
110	Input B trip
113	Communications card fault
114	Forced network trip
115	L1-T1 shorted
116	L2-T2 shorted
117	L3-T3 shorted
119	Bypass overload
120	SCR overtemperature

Code	Trip Type
121	Battery/clock
122	Thermistor circuit
124	RTD/PT100 B
133	Overpower
134	Underpower
142	Keypad disconnected
143	Zero Speed Detect
144	SCR Itsm
145	Instantaneous overcurrent
146	Rating Capacity
156	Current Read Err L1
157	Current Read Err L2
158	Current Read Err L3
159	Remove Mains Volts (mains voltage connected in run simulation)
160	Motor Connection T1
161	Motor Connection T2
162	Motor Connection T3
163	Firing Fail P1
164	Firing Fail P2
165	Firing Fail P3
166	VZC Fail P1
167	VZC Fail P2
168	VZC Fail P3
169	Low Control Volts
170~182	Internal fault x. Contact your local supplier with the fault code (X).

10.2 Parameter Lists



NOTE

The numbering of parameter options via communications starts at 0 (zero). For *Phase Sequence*, 0=Any Sequence, 1=Positive Only, 2=Negative Only.

Advanced model

Class 100 Objects (Read/Write)

Object Name	Class	Instance	Attribute
Motor Details			
<i>Command Source</i>	100	101	100
<i>Motor Full Load Current</i>	100	102	100
<i>Motor kW</i>	100	103	100
<i>Locked Rotor Time</i>	100	104	100
<i>Locked Rotor Current</i>	100	105	100
<i>Motor Service Factor</i>	100	106	100
<i>Reserved</i>	100	107	100
Motor Start/Stop			
<i>Start Mode</i>	100	108	100
<i>Start Ramp Time</i>	100	109	100
<i>Initial Current</i>	100	110	100
<i>Current Limit</i>	100	111	100
<i>Adaptive Start Profile</i>	100	112	100
<i>Kickstart Time</i>	100	113	100
<i>Kickstart Level</i>	100	114	100
<i>Jog Torque</i>	100	115	100
<i>Stop Mode</i>	100	116	100
<i>Stop Time</i>	100	117	100
<i>Adaptive Stop Profile</i>	100	118	100
<i>Adaptive Control Gain</i>	100	119	100
<i>Multi Pump</i>	100	120	100
<i>Start Delay</i>	100	121	100
<i>DC Brake Torque</i>	100	122	100
<i>DC Brake Time</i>	100	123	100
<i>Brake Current Limit</i>	100	124	100
<i>Soft Brake Delay</i>	100	125	100
Motor Start/Stop 2			
<i>Motor Full Load Current-2</i>	100	126	100
<i>Motor kW-2</i>	100	127	100
<i>Start Mode-2</i>	100	128	100
<i>Start Ramp Time-2</i>	100	129	100
<i>Initial Current-2</i>	100	130	100

Object Name	Class	Instance	Attribute
<i>Current Limit-2</i>	100	131	100
<i>Adaptive Start Profile-2</i>	100	132	100
<i>Kickstart Time-2</i>	100	133	100
<i>Kickstart Level-2</i>	100	134	100
<i>Jog Torque-2</i>	100	135	100
<i>Stop Mode-2</i>	100	136	100
<i>Stop Time-2</i>	100	137	100
<i>Adaptive Stop Profile-2</i>	100	138	100
<i>Adaptive Control Gain-2</i>	100	139	100
<i>Multi Pump-2</i>	100	140	100
<i>Start Delay-2</i>	100	141	100
<i>DC Brake Torque-2</i>	100	142	100
<i>DC Brake Time-2</i>	100	143	100
<i>Brake Current Limit-2</i>	100	144	100
<i>Soft Brake Delay-2</i>	100	145	100
Auto-Start/Stop			
<i>Auto-Start/Stop Mode</i>	100	146	100
<i>Run Time</i>	100	147	100
<i>Stopped Time</i>	100	148	100
<i>Sunday Mode</i>	100	149	100
<i>Sunday Start Time</i>	100	150	100
<i>Sunday Stop Time</i>	100	151	100
<i>Monday Mode</i>	100	152	100
<i>Monday Start Time</i>	100	153	100
<i>Monday Stop Time</i>	100	154	100
<i>Tuesday Mode</i>	100	155	100
<i>Tuesday Start Time</i>	100	156	100
<i>Tuesday Stop Time</i>	100	157	100
<i>Wednesday Mode</i>	100	158	100
<i>Wednesday Start Time</i>	100	159	100
<i>Wednesday Stop Time</i>	100	160	100
<i>Thursday Mode</i>	100	161	100
<i>Thursday Start Time</i>	100	162	100

Object Name	Class	Instance	Attribute
Auto-Start/Stop (continued)			
<i>Thursday Stop Time</i>	100	163	100
<i>Friday Mode</i>	100	164	100
<i>Friday Start Time</i>	100	165	100
<i>Friday Stop Time</i>	100	166	100
<i>Saturday Mode</i>	100	167	100
<i>Saturday Start Time</i>	100	168	100
<i>Saturday Stop Time</i>	100	169	100
Protection Levels			
<i>Current Imbalance</i>	100	170	100
<i>Current Imbalance Delay</i>	100	171	100
<i>Undercurrent</i>	100	172	100
<i>Undercurrent Delay</i>	100	173	100
<i>Overcurrent</i>	100	174	100
<i>Overcurrent Delay</i>	100	175	100
<i>Undervoltage</i>	100	176	100
<i>Undervoltage Delay</i>	100	177	100
<i>Overvoltage</i>	100	178	100
<i>Overvoltage Delay</i>	100	179	100
<i>Underpower</i>	100	180	100

Object Name	Class	Instance	Attribute
<i>Underpower Delay</i>	100	181	100
<i>Overpower</i>	100	182	100
<i>Overpower Delay</i>	100	183	100
<i>Excess Start Time</i>	100	184	100
<i>Restart Delay</i>	100	185	100
<i>Starts per Hour</i>	100	186	100
<i>Phase Sequence</i>	100	187	100
<i>Auto-Reset Count</i>	100	188	100
<i>Auto-Reset Delay</i>	100	189	100
Protection Actions			
<i>Current Imbalance</i>	100	190	100
<i>Undercurrent</i>	100	191	100
<i>Overcurrent</i>	100	192	100
<i>Undervoltage</i>	100	193	100
<i>Overvoltage</i>	100	194	100
<i>Underpower</i>	100	195	100
<i>Overpower</i>	100	196	100
<i>Excess Start Time</i>	100	197	100
<i>Input A Trip</i>	100	198	100
<i>Input B Trip</i>	100	199	100

Class 101 Objects (Read/Write)

Object Name	Class	Instance	Attribute
Protection Actions (continued)			
<i>Network Communications</i>	101	100	100
<i>Remote Keypad Fault</i>	101	101	100
<i>Frequency</i>	101	102	100
<i>Phase Sequence</i>	101	103	100
<i>Motor Overtemperature</i>	101	104	100
<i>Motor Thermistor Circuit</i>	101	105	100
<i>Shorted SCR Action</i>	101	106	100
<i>Battery/Clock</i>	101	107	100
Inputs			
<i>Input A Function</i>	101	108	100
<i>Input A Trip</i>	101	109	100
<i>Input A Trip Delay</i>	101	110	100
<i>Input A Initial Delay</i>	101	111	100
<i>Input B Function</i>	101	112	100
<i>Input B Trip</i>	101	113	100
<i>Input B Trip Delay</i>	101	114	100
<i>Input B Initial Delay</i>	101	115	100
<i>Reset/Enable Logic</i>	101	116	100
<i>Input A Name</i>	101	117	100
<i>Input B Name</i>	101	118	100
Relay Outputs			
<i>Relay A Function</i>	101	119	100
<i>Relay A On Delay</i>	101	120	100
<i>Relay A Off Delay</i>	101	121	100
<i>Relay B Function</i>	101	122	100
<i>Relay B On Delay</i>	101	123	100
<i>Relay B Off Delay</i>	101	124	100
<i>Low Current Flag</i>	101	125	100
<i>High Current Flag</i>	101	126	100
<i>Motor Temperature Flag</i>	101	127	100
<i>Main Contactor Time</i>	101	128	100
Analog Output			
<i>Analog Output A</i>	101	129	100
<i>Analog A Scale</i>	101	130	100
<i>Analog A Max Adjustment</i>	101	131	100
<i>Analog A Min Adjustment</i>	101	132	100

Object Name	Class	Instance	Attribute
Display			
<i>Language</i>	101	133	100
<i>Temperature Scale</i>	101	134	100
<i>Graph Timebase</i>	101	135	100
<i>Graph Maximum Adjustment</i>	101	136	100
<i>Graph Minimum Adjustment</i>	101	137	100
<i>Current Calibration</i>	101	138	100
<i>Adjustment Lock</i>	101	139	100
<i>User Parameter 1</i>	101	140	100
<i>User Parameter 2</i>	101	141	100
<i>User Parameter 3</i>	101	142	100
<i>User Parameter 4</i>	101	143	100
<i>User Parameter 5</i>	101	144	100
<i>User Parameter 6</i>	101	145	100
Pump Clean			
<i>Reverse Torque</i>	101	146	100
<i>Reverse Time</i>	101	147	100
<i>Forward Current Limit</i>	101	148	100
<i>Forward Time</i>	101	149	100
<i>Pump Stop Mode</i>	101	150	100
<i>Pump Stop Time</i>	101	151	100
<i>Pump Clean Cycles</i>	101	152	100
Communications Card			
<i>Modbus Address</i>	101	153	100
<i>Modbus Baud Rate</i>	101	154	100
<i>Modbus Parity</i>	101	155	100
<i>Modbus Timeout</i>	101	156	100
<i>Devicenet Address</i>	101	157	100
<i>Devicenet Baud Rate</i>	101	158	100
<i>Profibus Address</i>	101	159	100
<i>Gateway Address</i>	101	160	100
<i>Gateway Address 2</i>	101	161	100
<i>Gateway Address 3</i>	101	162	100
<i>Gateway Address 4</i>	101	163	100
<i>IP Address</i>	101	164	100
<i>IP Address 2</i>	101	165	100
<i>IP Address 3</i>	101	166	100
<i>IP Address 4</i>	101	167	100

Object Name	Class	Instance	Attribute
Communications Card (continued)			
<i>Subnet Mask</i>	101	168	100
<i>Subnet Mask 2</i>	101	169	100
<i>Subnet Mask 3</i>	101	170	100
<i>Subnet Mask 4</i>	101	171	100
<i>DHCP</i>	101	172	100
<i>Location ID</i>	101	173	100

Object Name	Class	Instance	Attribute
Advanced			
<i>Tracking Gain</i>	101	174	100
<i>Pedestal Detect</i>	101	175	100
<i>Bypass Contactor Delay</i>	101	176	100
<i>Model Rating</i>	101	177	100
<i>Screen Timeout</i>	101	178	100
<i>Motor Connection</i>	101	179	100

Basic model

Class 100 Objects (Read/Write)

Object Name	Class	Instance	Attribute
Motor Details			
Command Source	100	101	100
Motor Full Load Current	100	102	100
Locked Rotor Time	100	103	100
Locked Rotor Current	100	104	100
Motor Service Factor	100	105	100
Reserved	100	106	100
Motor Start/Stop			
Start Mode	100	107	100
Start Ramp Time	100	108	100
Initial Current	100	109	100
Current Limit	100	110	100
Adaptive Start Profile	100	111	100
Stop Mode	100	112	100
Stop Time	100	113	100
Adaptive Stop Profile	100	114	100
Adaptive Control Gain	100	115	100
Multi Pump	100	116	100
Start Delay	100	117	100
Protection Levels			
Current Imbalance	100	118	100
Current Imbalance Delay	100	119	100
Undercurrent	100	120	100
Undercurrent Delay	100	121	100
Overcurrent	100	122	100
Overcurrent Delay	100	123	100
Excess Start Time	100	124	100
Restart Delay	100	125	100
Starts per Hour	100	126	100
Phase Sequence	100	127	100
Auto-Reset Count	100	128	100
Auto-Reset Delay	100	129	100
Protection Actions			
Current Imbalance	100	130	100
Undercurrent	100	131	100
Overcurrent	100	132	100
Excess Start Time	100	133	100

Object Name	Class	Instance	Attribute
Input A Trip	100	134	100
Input B Trip	100	135	100
Network Communications	100	136	100
Remote Keypad Fault	100	137	100
Frequency	100	138	100
Phase Sequence	100	139	100
Motor Overtemperature	100	140	100
Motor Thermistor Circuit	100	141	100
Inputs			
Input A Function	100	142	100
Input A Trip	100	143	100
Input A Trip Delay	100	144	100
Input A Initial Delay	100	145	100
Input B Function	100	146	100
Input B Trip	100	147	100
Input B Trip Delay	100	148	100
Input B Initial Delay	100	149	100
Reset/Enable Logic	100	150	100
Input A Name	100	151	100
Input B Name	100	152	100
Relay Outputs			
Relay A Function	100	153	100
Relay A On Delay	100	154	100
Relay A Off Delay	100	155	100
Relay B Function	100	156	100
Relay B On Delay	100	157	100
Relay B Off Delay	100	158	100
Low Current Flag	100	159	100
High Current Flag	100	160	100
Motor Temperature Flag	100	161	100
Main Contactor Time	100	162	100
Analog Output			
Analog Output A	100	163	100
Analog A Scale	100	164	100
Analog A Max Adjustment	100	165	100
Analog A Min Adjustment	100	166	100

Object Name	Class	Instance	Attribute
Display			
<i>Language</i>	100	167	100
<i>Temperature Scale</i>	100	168	100
<i>Graph Timebase</i>	100	169	100
<i>Graph Maximum Adjustment</i>	100	170	100
<i>Graph Minimum Adjustment</i>	100	171	100
<i>Current Calibration</i>	100	172	100
<i>Adjustment Lock</i>	100	173	100
<i>User Parameter 1</i>	100	174	100
<i>User Parameter 2</i>	100	175	100
<i>User Parameter 3</i>	100	176	100
<i>User Parameter 4</i>	100	177	100
<i>User Parameter 5</i>	100	178	100
<i>User Parameter 6</i>	100	179	100
Communications Card			
<i>Modbus Address</i>	100	180	100
<i>Modbus Baud Rate</i>	100	181	100
<i>Modbus Parity</i>	100	182	100

Object Name	Class	Instance	Attribute
<i>Modbus Timeout</i>	100	183	100
<i>Devicenet Address</i>	100	184	100
<i>Devicenet Baud Rate</i>	100	185	100
<i>Profibus Address</i>	100	186	100
<i>Gateway Address</i>	100	187	100
<i>Gateway Address 2</i>	100	188	100
<i>Gateway Address 3</i>	100	189	100
<i>Gateway Address 4</i>	100	190	100
<i>IP Address</i>	100	191	100
<i>IP Address 2</i>	100	192	100
<i>IP Address 3</i>	100	193	100
<i>IP Address 4</i>	100	194	100
<i>Subnet Mask</i>	100	195	100
<i>Subnet Mask 2</i>	100	196	100
<i>Subnet Mask 3</i>	100	197	100
<i>Subnet Mask 4</i>	100	198	100
<i>DHCP</i>	100	199	100

Class 101 Objects (Read/Write)

Object Name	Class	Instance	Attribute
Communications Card (continued)			
<i>Location ID</i>	101	100	100
Advanced			
<i>Tracking Gain</i>	101	101	100
<i>Pedestal Detect</i>	101	102	100

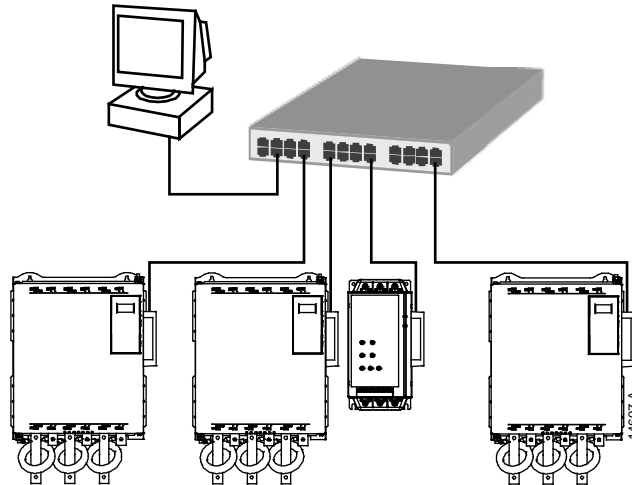
Object Name	Class	Instance	Attribute
<i>Bypass Contactor Delay</i>	101	103	100
<i>Model Rating</i>	101	104	100
<i>Screen Timeout</i>	101	105	100
<i>Motor Connection</i>	101	106	100

11 Network Design

The device supports star, line and ring topologies.

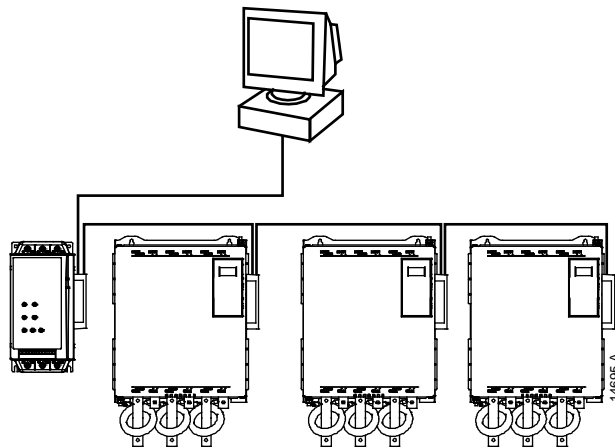
11.1 Star Topology

In a star network, all controllers and devices connect to a central network switch.



11.2 Line Topology

In a line network, the controller connects directly to one port of the first card. The second Ethernet port connects to another card, which in turn connects to another device until all devices are connected.



NOTE

The device has an integrated switch to allow data to pass through in line topology. The device must be receiving control power from the soft starter for the switch to operate.



NOTE

If the connection between two devices is interrupted, the controller cannot communicate with devices after the interruption point.



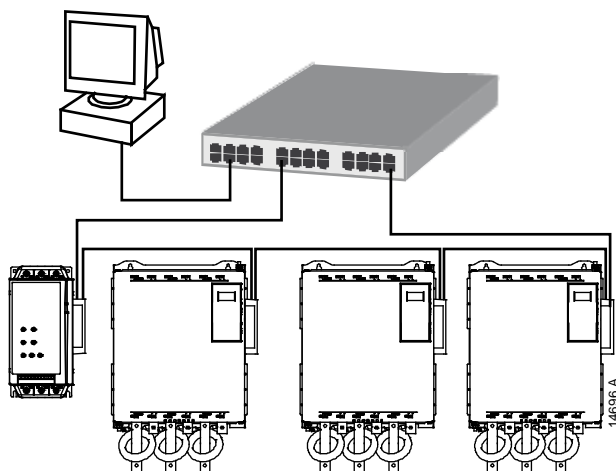
NOTE

Each connection adds a delay to communication with the next device. The maximum number of devices in a line network is 32. Exceeding this number may reduce the reliability of the network.

11.3 Ring Topology

In a ring topology network, the controller connects to the first card, via a network switch. The second Ethernet port of the card connects to another device, which in turn connects to another device until all devices are connected. The final device connects back to the switch.

The device supports beacon based ring node configuration.

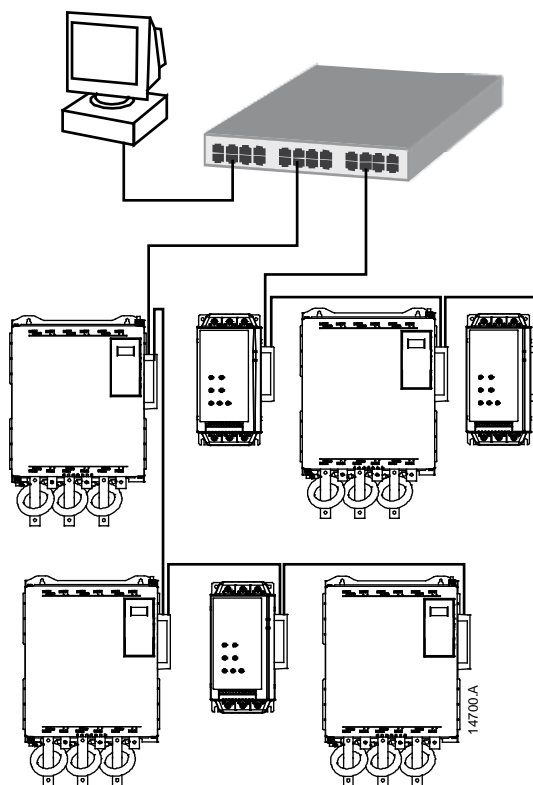


NOTE

The network switch must support loss of line detection.

11.4 Combined Topologies

A single network can include both star and line components.



12 Specifications

Connections

Soft starter 6-way pin assembly
Contacts Gold flash
Network RJ45

Settings

IP address Automatically assigned, configurable
Device name Automatically assigned, configurable


Network

Link speed 10 Mbps, 100 Mbps (auto-detect)
Full duplex
Auto crossover

Power

Consumption (steady state, maximum) 35 mA @ 24 VDC
Reverse polarity protected
Galvanically isolated

Certification

CE EN 60947-4-2
ODVA  *conformance tested*



BENSHAW
Applied Motor Controls

BENSHAW
615 Alpha Drive
Pittsburgh, PA 15238
Phones: (412) 968-0100
Fax: (412) 968-5415

BENSHAW Canada
550 Bright Street
Listowel, Ontario N4W 3W3
Phone: (519) 291-5112
Fax: (519) 291-2595



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