

## 6 Boards and units

### 6.2.5. DSQC 355A, Analog I/O

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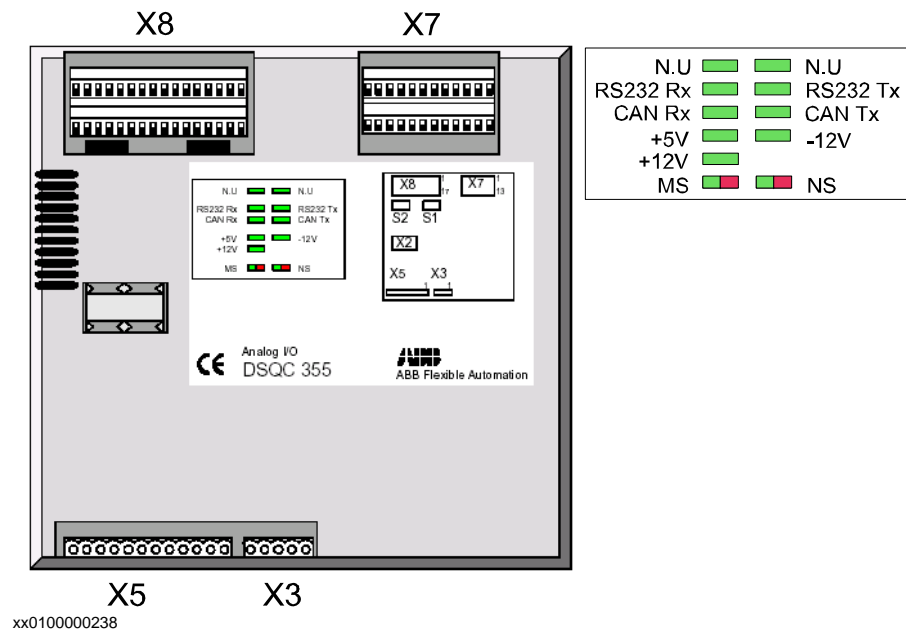
#### Description

The DSQC 355A is a circuit board normally mounted inside the control module. As an option, it may also be mounted in an external I/O module.

The unit handles interface between the robot system and any external systems through analog input and output signals.

#### Illustration

The figure below shows the DSQC 355A board:



#### Parts

The following table refers to the illustration in section *Illustration on page 88*.

| Item | Description   |
|------|---|
| X3   | Back-up feed supply<br>See section <a href="#">Connector X3 on page 89</a> for connection tables! |
| X5   | DeviceNet connector<br>See section <a href="#">Connector X5 on page 89</a> !                      |
| X7   | Analog outputs<br>See section <a href="#">Connector X7 on page 90</a> for connection tables!      |
| X8   | Analog inputs<br>See section <a href="#">Connector X8 on page 91</a> for connection tables!       |

**Facts, DSQC 355A**

This section specifies a number of facts applicable to the DSQC 355A. Unless stated otherwise, the data applies to the standard version.

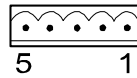
## Technical data

|                |   |
|----------------|---|
| SW connections | Support for the following connections: <ul style="list-style-type: none"> <li>• Polled</li> <li>• Change-Of-State</li> <li>• Change-Of-State with acknowledge suppression</li> </ul> For descriptions of the different types of I/O connections, see <a href="#">I/O messages - connection types on page 11</a> . |
|----------------|---|

## Unit ID and setup

The unit must be given an ID address, and setup parameters must be entered into the system.

## Connector X3

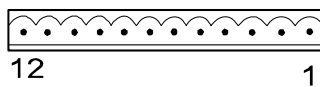


xx0100000221

The following table shows the connections to connector X3:

| Signal name | X3 pin | Function                |
|-------------|--------|-------------------------|
| 0 VDC       | 1      | Supply voltage GND      |
| NC          | 2      | Not connected           |
| GND         | 3      | Ground connection       |
| NC          | 4      | Not connected           |
| + 24 VDC    | 5      | Supply voltage + 24 VDC |

## Connector X5



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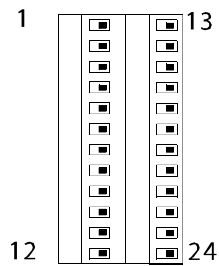
Connector X5 is a DeviceNet connector further described in section [Setting DeviceNet bus ID on page 70](#).

## 6 Boards and units

### 6.2.5. DSQC 355A, Analog I/O

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Connector X7



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The following table shows the connections to connector X7:

| Signal name | X7 pin | Function                     |
|-------------|--------|------------------------------|
| ANOUT_1     | 1      | Analog output 1, -10 V/+10 V |
| ANOUT_2     | 2      | Analog output 2, -10 V/+10 V |
| ANOUT_3     | 3      | Analog output 3, -10 V/+10 V |
| ANOUT_4     | 4      | Analog output 4, 4-20 mA     |
| Not used    | 5      |                              |
| Not used    | 6      |                              |
| Not used    | 7      |                              |
| Not used    | 8      |                              |
| Not used    | 9      |                              |
| Not used    | 10     |                              |
| Not used    | 11     |                              |
| Not used    | 12     |                              |
| Not used    | 13     |                              |
| Not used    | 14     |                              |
| Not used    | 15     |                              |
| Not used    | 16     |                              |
| Not used    | 17     |                              |
| Not used    | 18     |                              |
| GND         | 19     | Analog output 1, 0 V         |
| GND         | 20     | Analog output 2, 0 V         |
| GND         | 21     | Analog output 3, 0 V         |
| GND         | 22     | Analog output 4, 0 V         |
| GND         | 23     |                              |
| GND         | 24     |                              |

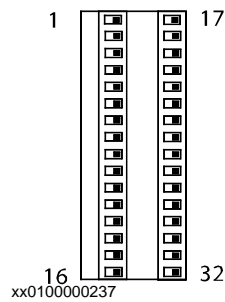


#### **NOTE!**

The load on analog outputs on current mode must always be between 500-1000 ohm.

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## Connector X8



The following table shows the connections to connector X8:

| Signal name | X8 pin | Function                    |
|-------------|--------|-----------------------------|
| ANIN_1      | 1      | Analog input 1, -10 V/+10 V |
| ANIN_2      | 2      | Analog input 2, -10 V/+10 V |
| ANIN_3      | 3      | Analog input 3, -10 V/+10 V |
| ANIN_4      | 4      | Analog input 4, -10 V/+10 V |
| Not used    | 5      |                             |
| Not used    | 6      |                             |
| Not used    | 7      |                             |
| Not used    | 8      |                             |
| Not used    | 9      |                             |
| Not used    | 10     |                             |
| Not used    | 11     |                             |
| Not used    | 12     |                             |
| Not used    | 13     |                             |
| Not used    | 14     |                             |
| Not used    | 15     |                             |
| Not used    | 16     |                             |
| +24 V out   | 17     | +24 VDC supply              |
| +24 V out   | 18     | +24 VDC supply              |
| +24 V out   | 19     | +24 VDC supply              |
| +24 V out   | 20     | +24 VDC supply              |
| +24 V out   | 21     | +24 VDC supply              |
| +24 V out   | 22     | +24 VDC supply              |
| +24 V out   | 23     | +24 VDC supply              |
| +24 V out   | 24     | +24 VDC supply              |
| GND         | 25     | Analog input 1, 0 V         |
| GND         | 26     | Analog input 2, 0 V         |
| GND         | 27     | Analog input 3, 0 V         |
| GND         | 28     | Analog input 4, 0 V         |
| GND         | 29     |                             |
| GND         | 30     |                             |
| GND         | 31     |                             |
| GND         | 32     |                             |

Continues on next page

## 6 Boards and units

### 6.2.5. DSQC 355A, Analog I/O

*Continued*

#### Board specific LEDs

The designations refer to LEDs shown in the figure in section *Illustration on page 88*.

| Designation             | Color | Description   |
|-------------------------|-------|---|
| RS232 Rx                | Green | Indicates the state of the RS232 Rx line. LED is active when receiving data. If there is no light, check communication line and connections.  |
| RS232 Tx                | Green | Indicates the state of the RS232 Tx line. LED is active when transceiving data. If there is no light when transmission is expected, check error messages. Check also system boards in rack.   |
| +5VDC / +12VDC / -12VDC | Green | Indicates that supply voltage is present and at correct level. If there is no light, check that voltage is present on power unit and that power is present in power connector. If not, check cables and connectors. If power is applied to the unit but it does not work, replace the unit. |

#### General LEDs

The significance of the LEDs are specified in section *DeviceNet Bus and I/O board status LED description on page 65*.

#### Input map

The figure below shows the analog input mapping.



#### NOTE!

Pay attention to the order of the bits for the analog signals.

| Input byte | Bit  |   |   |   |   |   |   |   | Bit range |
|------------|------|---|---|---|---|---|---|---|-----------|
|            | 7    | 6 | 5 | 4 | 3 | 2 | 1 | 0 |           |
| 0          | LSB  |   |   |   |   |   |   |   | 0-15      |
| 1          | AI 1 |   |   |   |   |   |   |   |           |
|            | MSB  |   |   |   |   |   |   |   |           |
| 2          | LSB  |   |   |   |   |   |   |   | 16-31     |
| 3          | AI 2 |   |   |   |   |   |   |   |           |
|            | MSB  |   |   |   |   |   |   |   |           |
| 4          | LSB  |   |   |   |   |   |   |   | 32-47     |
| 5          | AI 3 |   |   |   |   |   |   |   |           |
|            | MSB  |   |   |   |   |   |   |   |           |
| 6          | LSB  |   |   |   |   |   |   |   | 48-63     |
| 7          | AI 4 |   |   |   |   |   |   |   |           |
|            | MSB  |   |   |   |   |   |   |   |           |

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|     |   |
|-----|---|
| LSB | The <i>least</i> significant bit of the binary number representing the analog signal. |
| MSB | The <i>most</i> significant bit of the binary number representing the analog signal.  |

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## Output map

The figure below shows the analog output mapping.

**NOTE!**

Pay attention to the order of the bits for the analog signals.

| Output byte | Bit |   |   |   |   |   |   |      | Bit range |
|-------------|-----|---|---|---|---|---|---|------|-----------|
|             | 7   | 6 | 5 | 4 | 3 | 2 | 1 | 0    |           |
| 0           |     |   |   |   |   |   |   | LSB  | 0-15      |
| 1           | MSB |   |   |   |   |   |   | AO 1 |           |
| 2           |     |   |   |   |   |   |   | LSB  | 16-31     |
| 3           | MSB |   |   |   |   |   |   | AO 2 |           |
| 4           |     |   |   |   |   |   |   | LSB  | 32-47     |
| 5           | MSB |   |   |   |   |   |   | AO 3 |           |
| 6           |     |   |   |   |   |   |   | LSB  | 48-63     |
| 7           | MSB |   |   |   |   |   |   | AO 4 |           |

en040000805

|     |   |
|-----|---|
| LSB | The <i>least</i> significant bit of the binary number representing the analog signal. |
| MSB | The <i>most</i> significant bit of the binary number representing the analog signal.  |

## Numerical format

The numerical representation of the values are described in the table below:

| Signal      | Analog physical value | Hexadecimal number | Bit value          |
|-------------|-----------------------|--------------------|--------------------|
| AO 1 - AO 3 | +10 V                 | 0x7FFF             | MaxBitVal = 32767  |
|             | 0 V                   | 0x0                |                    |
|             | -10 V                 | 0x800              | MinBitVal = -32768 |
| AO 4        | 20 mA                 | 0xFFFF             | MaxBitVal = 65535  |
|             | 4 mA                  | 0x0                | MinBitVal = 0      |
| AI 1 - AI 4 | +10 V                 | 0x7FFF             | MaxBitVal = 32767  |
|             | 0 V                   | 0x0                |                    |
|             | -10 V                 | 0x8000             | MinBitVal = -32768 |

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## 6 Boards and units

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### 6.2.5. DSQC 355A, Analog I/O

*Continued*

#### Additional information

The table shows the physical type of the signals, resolution etc.

| Signal | Type    | Range          | Resolution | Encoding type   |
|--------|---------|----------------|------------|-----------------|
| AO 1   | Voltage | -10 V .. +10 V | 12 bit     | Twos complement |
| AO 2   | Voltage | -10 V .. +10 V | 12 bit     | Twos complement |
| AO 3   | Voltage | -10 V .. +10 V | 12 bit     | Twos complement |
| AO 4   | Current | 4 mA .. 20 mA  | 12 bit     | Unsigned        |
| AI 1   | Voltage | -10 V .. +10 V | 16 bit     | Twos complement |
| AI 2   | Voltage | -10 V .. +10 V | 16 bit     | Twos complement |
| AI 3   | Voltage | -10 V .. +10 V | 16 bit     | Twos complement |
| AI 4   | Voltage | -10 V .. +10 V | 16 bit     | Twos complement |