

5.2 Unit descriptions

5.2.1. Introduction

Overview

This section includes descriptions of the different I/O units that support DeviceNet communication. Following units are described:

Board designation	Name of unit	Type of unit	Article number
DSQC 327A	AD combi I/O	Distributed I/O unit	3HAC 17971-1
DSQC 328A	Digital I/O	Distributed I/O unit	3HAC 17970-1
DSQC 332A	Digital I/O with relay outputs	Distributed I/O unit	3HAC 17973-1
DSQC 355A	Analog I/O	Distributed I/O unit	3HNE00554-1
DSQC 350A	DeviceNet/AllenBradley remote I/O	Gateway unit	3HNE00025-1
DSQC 351A	DeviceNet/INTERBUS	Gateway unit	3HNE00006-1
DSQC 352A	DeviceNet/PROFIBUS-DP	Gateway unit	3HNE00009-1
DSQC 378A	DeviceNet/CCLink	Gateway unit	
DSQC 377A	Queue tracking	Encoder interface unit	3HNE01586-1

5.2.8. DSQC 352A, DeviceNet/PROFIBUS-DP gateway

Description

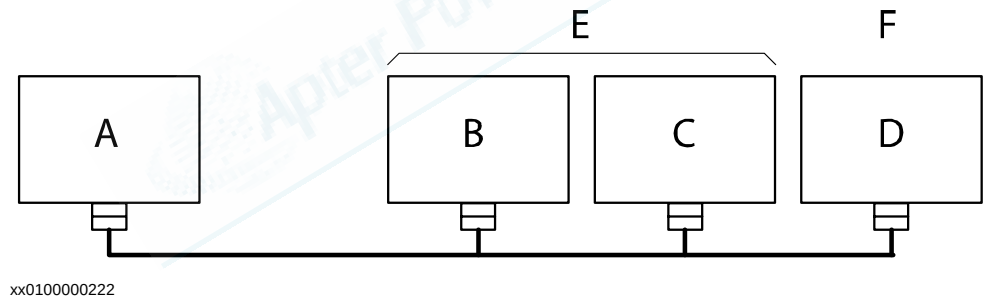
The DSQC 352A is a circuit board normally mounted in the control module. As an option, it may also be mounted in an external I/O unit.

The unit handles input and output signals between the DeviceNet system and the PROFIBUS-DP system.

Communication concept

The PROFIBUS-DP system is able to communicate with a number of external devices, depending on the number of process words occupied by each unit. The robot controller may be equipped with several DSQC 352A boards. The PROFIBUS-DP inputs and outputs are accessible in the robot controller as general inputs and outputs.

Following figure is an outline diagram of the communication concept:



A	Master PLC (customer equipment)
B	Robot 1 controller, word 1-8
C	Robot 1 controller, word 9-16
D	Robot 2 controller, word 17-24
E	256 inputs/256 outputs
F	128 inputs/128 outputs

Note! The PROFIBUS cable must be terminated in both ends.

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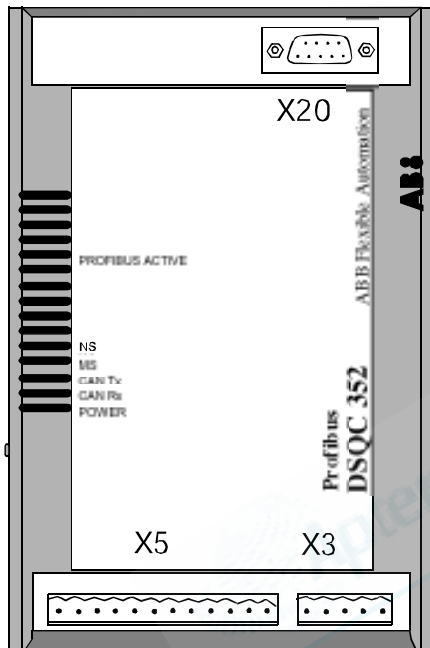
5 Boards and units

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Illustration

The figure below shows the DSQC 352A board:



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Parts

The table below refers to the illustration in section [Illustration on page 120](#).

Item	Description
X3	Back-up feed supply See section Connector X3 on page 121 for connection tables!
X5	DeviceNet connector See section Connector X5 on page 122 !
X20	PROFIBUS connection See section Connector X20 on page 122 for connection tables!

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Facts, DSQC 352A

This section specifies a number of facts applicable to the DSQC 352A. Unless stated otherwise, the data applies to the standard version.

Also see the [PROFIBUS-DP specification](#), International Standard DIN E 19245 part 3.

Technical data

SW connections	Support for the following connections: • Polled • Change-Of-State • Change-Of-State with acknowledge suppression For descriptions of the different types of I/O connections, see I/O messages - connection types on page 15.
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Supply

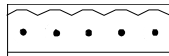
The PROFIBUS-DP does not need any external power feed, power is supplied via X5.

All the robots cells are connected to the trunk cable via a special D-sub connector which works as a very short drop cable. Because of this, the PROFIBUS will work correctly even if a robot cell is turned off.

Unit ID and setup

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

Connector X3



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The table below 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

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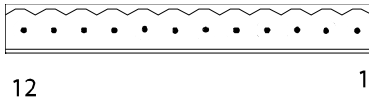
5 Boards and units

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Signal name	X3 pin	Function
NC	4	Not connected
+ 24 VDC	5	Supply voltage + 24 VDC

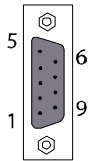
Connector X5



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Connector X5 is a DeviceNet connector further described in section [Setting DeviceNet bus ID on page 62](#).

Connector X20



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The table below shows the connections to connector X20:

Signal name	X20 pin	Function
Shield	1	Cable screen
NC	2	Not connected
RxD/TxD-P	3	Receive/Transmit data P
Control-P	4	
GND	5	Ground connection
+5 VDC	6	
NC	7	Not connected
RxD/TxD-N	8	Receive/Transmit data N
NC	9	Not connected

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Board specific LEDs

The designations refer to LEDs shown in the figure in section [Illustration on page 120](#).

Designation	Color	Description
PROFIBUS active	Green	Lit when the node is communicating with the master. If there is no light, check system messages in robot and in PROFIBUS net.
POWER, 24 VDC	Green	Indicates that a supply voltage is present, and has a level above 12 VDC. If there is no light, check that voltage is present in power unit and in the 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 55](#).

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Input map

The figure below shows the digital input mapping.

Input byte	Bit								Bit range
	7	6	5	4	3	2	1	0	
0	DI 8	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	0-7
1	DI 16	DI 15	DI 14	DI 13	DI 12	DI 11	DI 10	DI 9	8-15
.	.	.	.	.	.	.	.	.	Depends on MasterInput-Size
(m*2)-1	DI (m*16)	DI (m*16)-1	DI (m*16)-2	DI (m*16)-3	DI (m*16)-4	DI (m*16)-5	DI (m*16)-6	DI (m*16)-7	Depends on MasterInput-Size
(m*2)	Profibus Status	N.U.	N.U.	N.U.	N.U.	N.U.	N.U.	N.U.	Depends on MasterInput-Size

en0400000804

m	The number of words (16 bit) that the unit has been configured to, using the Fieldbus Command Type <code>MasterInputSize</code> .
PROFIBUS Status	The status of the PROFIBUS communication can be monitored using the signal <i>PROFIBUS Status</i> . When <i>PROFIBUS Status</i> is set it indicate that the unit is in data communication with the PLC/master controlling it.
N.U.	Not used. The signal position is reserved for future use and shall not be used.

The *PROFIBUS Status* signal is located in the last bit of the last byte of the input area. For example, if the `MasterInputSize` is set to 4 (words) there are 8 bytes of input data (bit 0-63), and the *PROFIBUS Status* is located in the last bit of the 9th byte i.e. bit 71.

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Output map

The figure below shows the digital output mapping.

Output byte	Bit								Bit range
	7	6	5	4	3	2	1	0	
0	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	0-7
1	DO 16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10	DO 9	8-15
.	.	.	.	.	.	.	.	.	Depends on MasterOutputSize
.	.	.	.	.	.	.	.	.	
.	.	.	.	.	.	.	.	.	
(m*2)-1	DO (m*16)	DO (m*16)-1	DO (m*16)-2	DO (m*16)-3	DO (m*16)-4	DO (m*16)-5	DO (m*16)-6	DO (m*16)-7	Depends on MasterOutputSize

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m	The number of words (16 bit) that the unit has been configured to, using the Fieldbus Command Type MasterOutputSize.
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Fieldbus Command Types

Following table gives necessary data on the Fieldbus Command Types for DeviceNet communication.

Fieldbus Command Type	Path (DeviceNet parameter)	Allowed values	Usage
MasterInputSize	6, 20 67 24 01 30 02, C6, 1	0-8 (words)	Determines the size of the input data area of the gateway module. The size is expressed in number of words (16 bit groups), which means that the maximum size of input data for one DSQC 352A is 128 bit. By reducing the size, the allocated bandwidth decreases and thus the throughput and performance of the network increase.
MasterOutputSize	6, 20 67 24 01 30 03, C6, 1	0-8 (words)	Determines the size of the output data area of the gateway module. The size is expressed in number of words (16 bit groups), which means that the maximum size of output data for one DSQC 352A is 128 bit. By reducing the size, the allocated bandwidth decreases and thus the throughput and performance of the network increase.
StationAddress	6, 20 67 24 01 30 04, C6, 1	2-126	Determines the address of the DSQC 352A on the PROFIBUS connection. The value that <code>StationAddress</code> is set to, is the gateway address found by the external master (PLC) connected to the PROFIBUS side of the gateway.

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Additional information

The data areas of the gateway are "byte-consistent", which means that signals within the same byte (groups of 8 bits) are handled as one piece and are guaranteed to belong to the same bus-cycle. Normally this does not cause any problems, but if a signal group has been defined accross the byte boundaries as e.g. a 16 bit group signal this needs to be considered. It is important to make sure that undesired behaviours are avoided in the case when the group signal is updated at exactly the same time as the gateway is beeing polled/scanned by one of the masters.

The values for the Fieldbus Command Types are stored in flash memory of the gateway module. Any change of these values requires a reset (or power cycle) of the gateway module before it actually assumes these new values. By using the standard configuration files for the gateways, the robot controller will automatically issue a reset command to activate the modified configuration.

To configure an external PROFIBUS master (PLC) to communicate with the gateway, a GSD-file is required. The GSD-file for the DSQC 352A is found on the RobotWare CD-ROM in following directory:

<CD-drive>:\Utility\fieldbus\PROFIBUS\gsd\abb_0600.gsd