

# Application Note: Using X9 As General I/O

## Overview

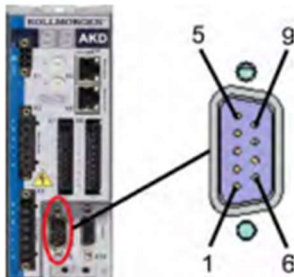
The X9 Port on the AKD drive is generally used as an encoder input, EEO (encoder emulated output), or not used. However, the AKD also has the feature to use the X9 port as general I/O.

## Wiring the AKD X9 General I/O:

The following document provides examples that illustrates how to wire the AKD Gen 1 X9 connector's I/O for General use. Note from the AKD Installation Manual the following chart which indicates 3 programmable I/O channels are available ( channels 9, 10, and 11 ).

### X9 I/O Wiring Connectivity:

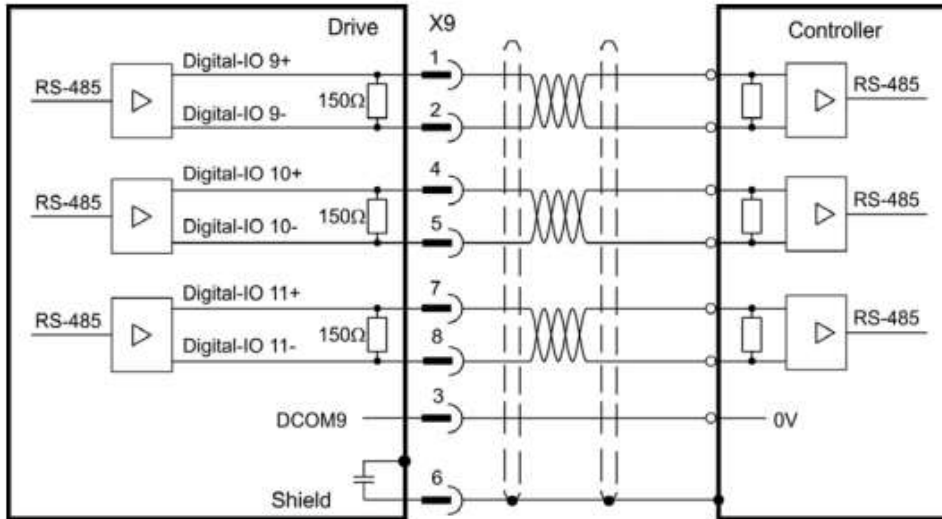
If X9 is not used for second feedback input or EEO, it offers three RS485 channels which are programmable as digital outputs.



Conn.	Pin	Signal	Abbreviation	Function	Wiring Diagram
X9	1	Digital In/Out 9+	Digital-IO 9+	Programmable	Output: (→ # 163)
X9	2	Digital In/Out 9-	Digital-IO 9-		
X9	3	Digital Common X9	DCOM9	Reference ground	
X9	4	Digital In/Out 10+	Digital-IO 10+	Programmable	
X9	5	Digital In/Out 10-	Digital-IO 10-		
X9	6	Shield	Shield	Cable shield	
X9	7	Digital In/Out 11+	Digital-IO 11+	Programmable	
X9	8	Digital In/Out 11-	Digital-IO 11-		
X9	9	reserved	reserved	reserved	

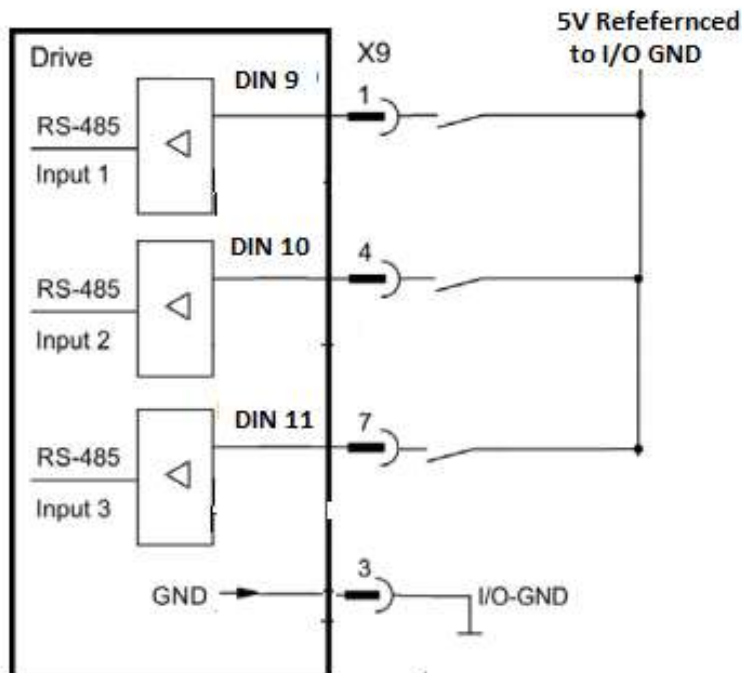
**When X9 is uses for general I/O per the pinout above, they are single ended I/O are referenced to pin 3 "I/O-GND" on connector X9**

## Differential RS485 General I/O Wiring Diagram with a Controller or PLC

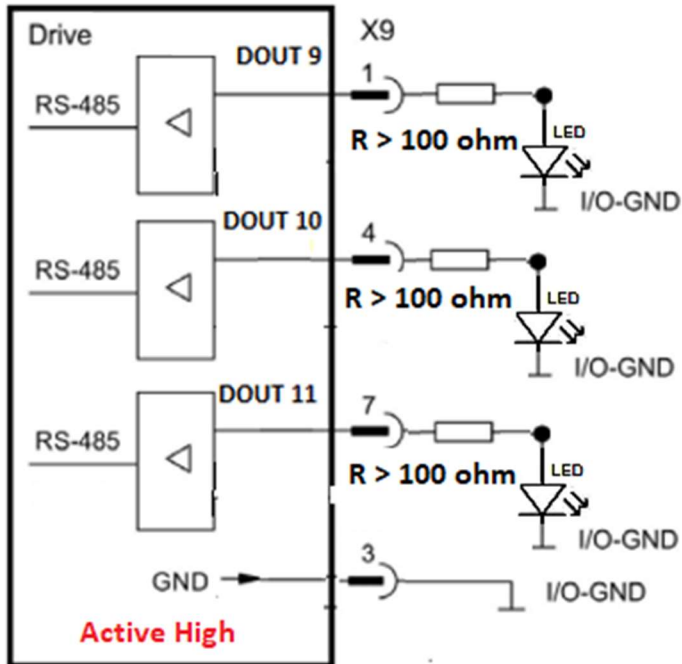


Note: The differential connection will provide much better noise immunity than the single Ended connection . **Although the manual shows a 150 ohm terminating resistor internally, it is actually required externally and customer supplied at the AKD Drive's X9 I/O connections.**

## Single Ended Wiring Diagram DIN 9, 10, & 11

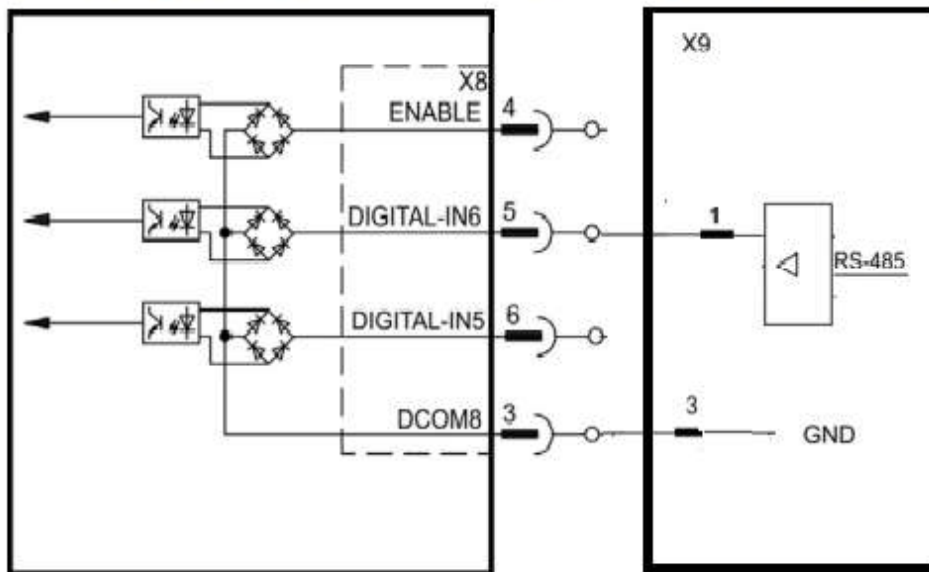


### Single Ended Wiring Diagram DOUT 9, 10, 11

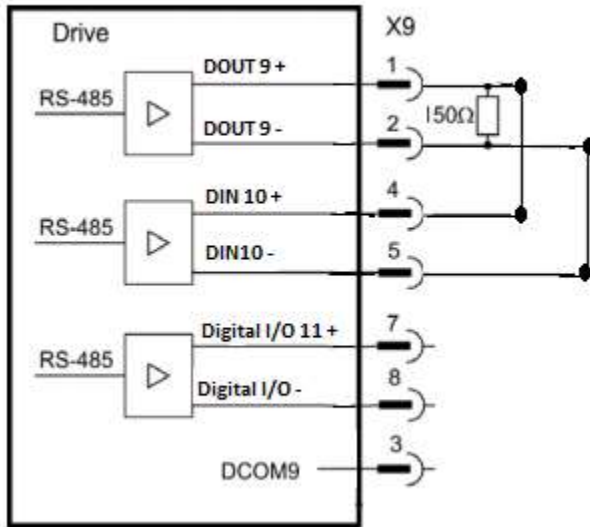


**ACTIVE HIGH ONLY! ^^^ Minimum allowable load impedance is 100 ohms**

### An Example of How to Connect X9 Dout 9 to X7 or X8 Discrete Inputs

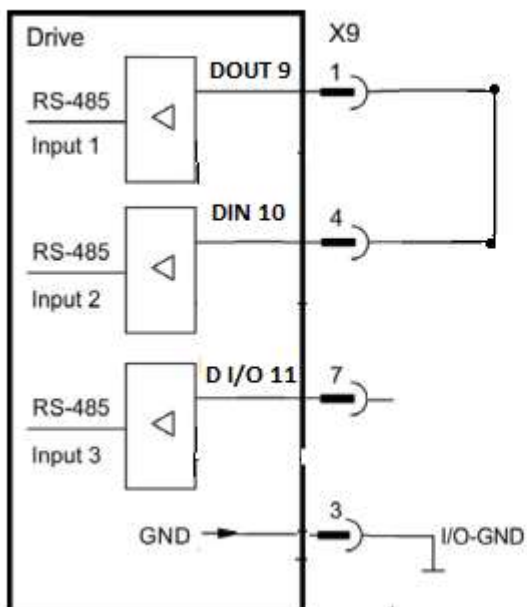


## Differential RS485 Wiring Diagram connecting Dout 9 to Din 10



The differential connection will provide much better noise immunity than the single Ended connection

## Single Ended Wiring Diagram Connecting DOUT 9 to DIN 10



The DOUT9 and the DIN10 are both referenced to the same I/O-GND.

## X9 I/O Configuration Parameters:

**DRV.EMUEMODE = 10** Allows the X9 connector to be used as a General Purpose I/O

**DIO9.DIR, DIO10.DIR and DIO11.DIR** This parameter changes the direction of the general purpose IO from the X9 connector. If DIOx.DIR is set 0 then the IO is configured as an input, while if DIOx.DIR is 1 the IO is configured as an output.

DIO9.DIR controls Pin 1

DIO10.DIR controls Pin 4

DIO11.DIR controls Pin 7 .

This parameter can be set at any time. It will be ignored unless DRV.EMUEMODE is set to 10

**DOUT9.MODE, DOUT10.MODE and DOUT11.MODE** Sets the functionality of the digital output(s). The table below summarizes the digital output modes; for detailed descriptions of each mode, see [Digital Inputs and Outputs](#). This parameter only has an effect when [DRV.EMUEMODE](#) is set to 10 (General Purpose I/O).

<b>DOUTx.MODE</b>	<b>Description</b>
<a href="#">0</a>	User (default = 0)
<a href="#">23</a>	Compare output
<a href="#">26</a>	Pulse Width Modulation (PWM) output

**Mode 0-User (Default = 0):**The output state is decided by the user or fieldbus. This mode is valid for all opmodes and command source combinations.

**Mode 23 – Compare Output:** This output mode reflects the state of the compare output. There are two compare engines and DOUTx.PARAM selects the engine (0 or 1) that controls this output

**DOUT9.STATEU, DOUT10.STATEU and DOUTT11.STATEU** Sets the state of the digital output node as follows:

0 = deactivated

1 = activated

**DOUT9.STATE, DOUT10.STATE and DOUTT11.STATE** Reads the state of one digital output according to the value stated in the command.

0 = Off

1 = On

**DIN9.STATE, DIN10.STATE and DIN11.STATE**

This parameter allows the user to see the actual level of the input signal, when the IO is set to input mode. Parameter value is 0 if signal is low and 1 if signal is high. DIOx.INV can affect the value in this register.

This parameter can be read at any time. The value is only guaranteed to correspond to the output on the X9 connector when DRV.EMUEMODE is set to 10 and the DIOX.DIR is 0.