HARDWARE MANUAL

Adv 400 Connections

Adv 400 Connections

700-100002-xHxx

June 16, 2006

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REVISION HISTORY				
REV.	**DESCRIPTION**	**DATE**	**CHG**	**APPVD**
1	INSERTED ANALOG 1/0 ADDRESS TABLE, P. 17	06/16/06	CP	V. BUROKAS

Table of Contents

INTRODUCTION

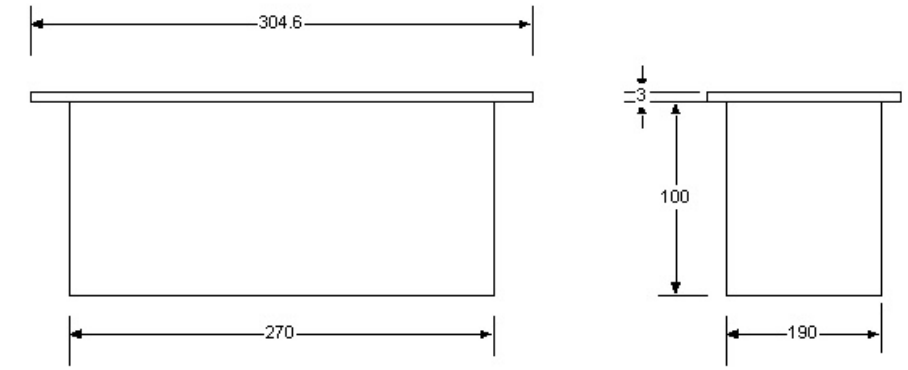
The Adv 400 provides the following connections:

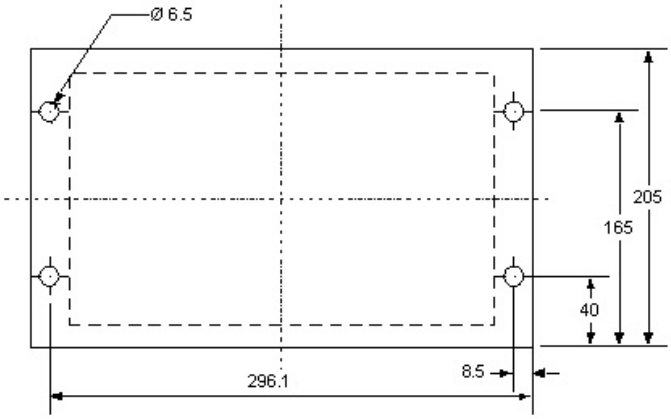
- Sub-D15 for four encoder inputs
- One Sub-D25 for amplifier connections: analog ±10V command output, amplifier enable and amplifier fault
- One Sub-D25 for flags connection: home, limit+, limit- and user
- One Sub-D25 for stepper driver connections: pulse and direction and EQU output for compare position feature
- One Sub-D15 for one extra encoder input used for handwheel or external time-base
- One Sub-D15 for two extra analog ±10V outputs and 3 analog inputs
- One Sub-D37 for 32 digital inputs
- One Sub-D25 for 16 digital outputs
- One HE26 multiplexed port for optional control panel and I/Os connections
- One Sub-D9 for RS232 interface
- One Sub-D9 for CAN bus devices

This manual describes these connections in detail.

HARDWARE SETUP

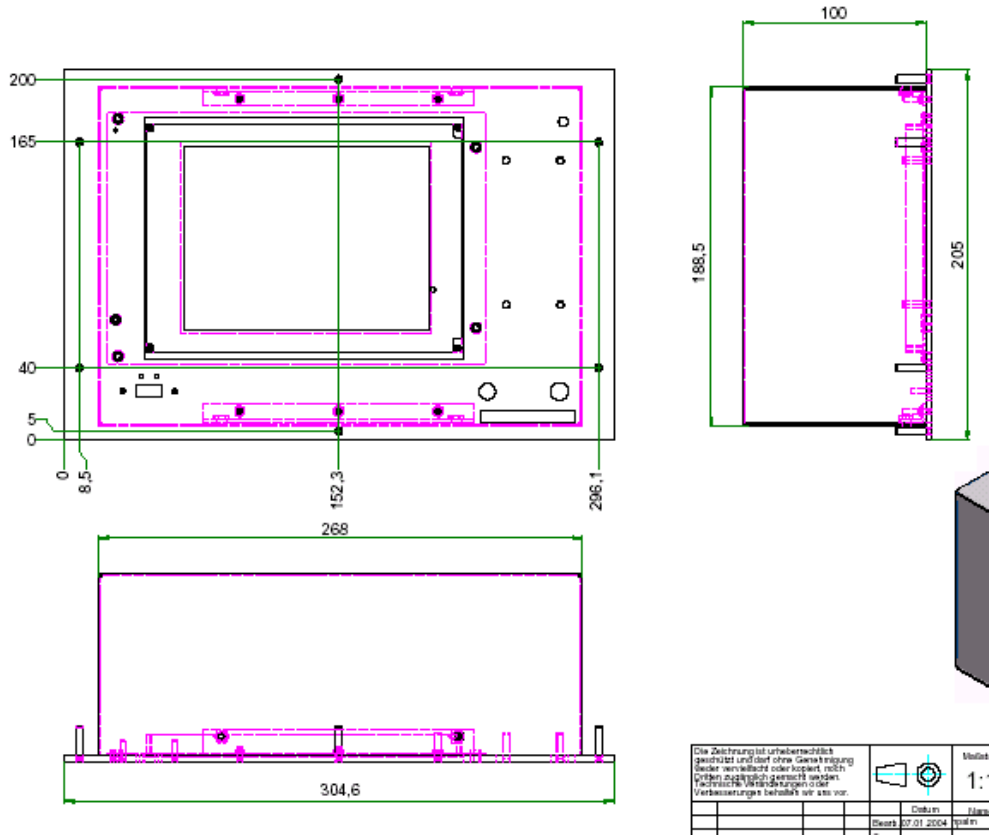
Mechanical dimensions for versions prior to year 2004:





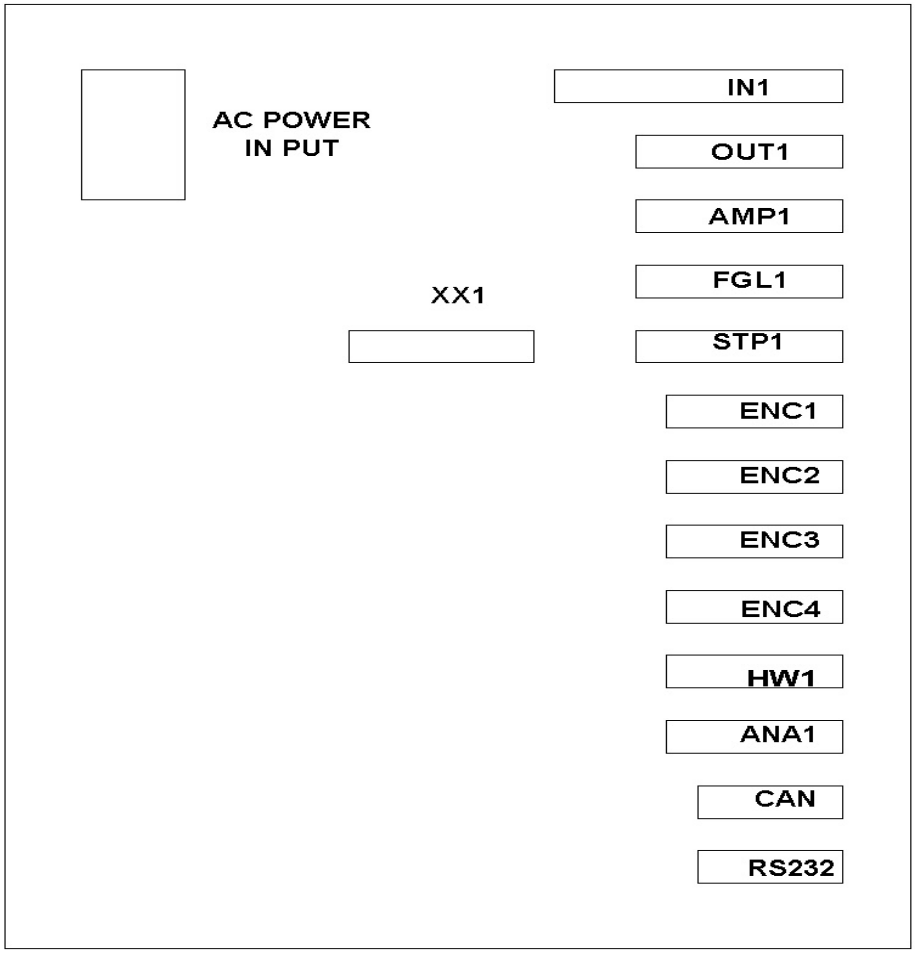
Enclosure Diagram

Mechanical dimensions for year 2004 version:



For fixation, these are 6x threaded stud M4 x 20 mm

Signal Interfaces



Position and Name of the Connectors on the Control Boxes Rear Side

- All signal interfaces are found on the rear side of the control box.
- Ports for the machine peripheral are female or male D-Sub connectors.
- Exceptions are the IDC header for the optional MUX port (XX+).

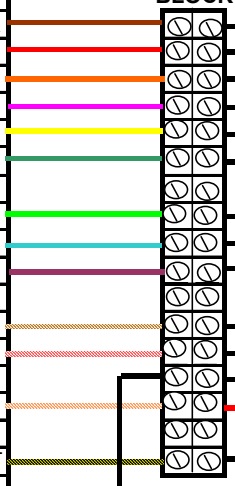
Handwheel Box Connection Diagram

Connection diagram of the optional EDHW-B Hand Wheel box to Adv 400

Hand Wheel Box

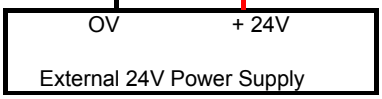
PIN	SIGNAL	COLOR	FUNCTION
		Cable	
1	V+	BROWN	MPG DC POWER
2	0V	RED	DC 0V
3	A	ORANGE	HW A+
4	B	PINK	HW B+
5	A\	YELLOW	HW A-
6	B\	GREEN	HW B-
7	I11	LIGHT GREEN	AXIS SELECT 1
8	I12	BLUE	AXIS SELECT 2
9	I13	PURPLE	AXIS SELECT 3
10	*I14*	*GREY*	*NOT USED*
11	I21	BROWN/WHITE	RATE SELECT 1
12	I22	RED/WHITE	RATE SELECT 2
13	*I23*	*RED/BLACK*	*NOT USED*
14	ICOM	0RANGE/WHITE	INPUT COMMON
15	S31	YELLOW/BLACK	HW BOX SELECT
16	*NC*	*BLUE/WHITE*	*NOT USED*
17	*NC*	*GREY/BLACK*	*NOT USED*

TERMINAL BLOCK



ADV400 controller

PIN	SIGNAL
HW CONNECTOR	
5	5V+
2	GND
1	CHA+
10	CHB+
9	CHA-
3	CHB-
INPUT CONNECTOR	
9	Input9
10	Input10
11	Input11
13	Input13
14	Input14
36	I_RET1
12	Input12



CONNECTORS

Encoder Connectors (ENC N)

On the backside of the control box, there are connectors for five incremental encoders. For encoder 5, see connector HW1. For encoders n (n=1-4) of the axis 1-4, the following specifications apply:

Connector Type: female connector, D-Sub 15
Position of Connector: see diagram
Name of Connector:

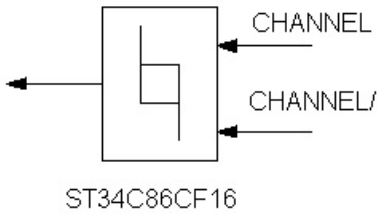
Female Connector	Axis
ENC 1	X
ENC 2	Y
ENC 3	Z
ENC 4	U / A / S

Cable Cross Section:

- Signal lines>=0.14mm2
- Supply lines>=0.5mm2

Enc n			
Pin#	**Symbol**	**Function**	**Description**
1	CHA1+	Input	Pos. A Chan.
2	GND	Common	Digital Reference
3	CHB1-	Input	Neg. B Chan.
4	CHC1+	Input	Pos. C Chan.
5	A+5V	Output	Digital Supply
6	NC		
7	NC		
8	NC		
9	CHA1-	Input	Neg. A Chan.
10	CHB1+	Input	Pos. B Chan.
11	GND	Common	Digital Reference
12	CHC1-	Input	Neg. C Chan.
13	NC		
14	A+5V	Output	Digital Supply
15	NC		

Any signal type (e.g. A, A/) on the control box side is connected to a differential line driver of the following type:



Encoder Input Driver

Supported Encoder Types

Incremental encoders with two differentials A quad B Signals (RS422). Optional C-channel is supported.

Encoder Specification

- Signal lines A, A/, B, B/, optional C, C/
- Maximum cycle output frequency 20MHz
- Current consumption <100mA
- Phase difference of A to B: 90 degree +/-30

Encoder Power Supply

The control boxes 5VDC via the respective female ENC n connector supply each encoder.

Note:

The maximum current consumption of all consumers (i.e. the encoders connected to ENC1, ENC2, ENC3, ENC4 and HW1, pulse and direction drivers on STP1, and multiplexed IO boards connected to XX1) must not exceed 2A.

Encoder Connecting Cable

Warning:

Only connect encoders when controller is powered down.

The maximum cable length depends on the transmission frequency and the power consumption of the encoder:

Current Consumption	Frequency	Maximum Cable Length
<100mA	1MHz	10m
<100mA	2MHz	5m

Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Analog Drive Interface (Amp1)

This interface is intended to connect four amplifiers with an analog interface (+/-10V). In order to use the amplifier enable lines, a field power supply is needed:

- Four differential/ single ended +/- 10V command output signals
- Analog ground used as reference for a single ended command signal only
- Four amplifier enable lines
- Four amplifier fault lines

Name of the Connector: AMP1

Position of Connector: See diagram

Connector Type: female, D-Sub 25

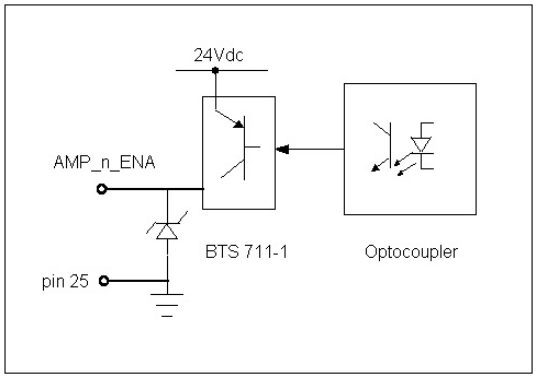
Cable Cross Section:

- Signal lines >=0.34mm2
- Power lines >=0.5mm2

AMP 1			
Pin#	**Symbol**	**Function**	**Description**
1	DAC1A+	Output	Analog Out X-Axis
2	DAC1A-	Output	Analog Out X-Axis
3	DAC2A+	Output	Analog Out Y-Axis
4	DAC2A-	Output	Analog Out Y-Axis
5	DAC3A+	Output	Analog Out Z-Axis
6	DAC3A-	Output	Analog Out Z-Axis
7	DAC4A+	Output	Analog Out U / A / S
8	DAC4A-	Output	Analog Out U / A / S
9	AGND	Output	Ref. for command (analog) out
10	AMP1-ENA	Output	Amplifier Enable X-Axis
11	AMP2-ENA	Output	Amplifier Enable Y-Axis
12	AMP3-ENA	Output	Amplifier Enable Z-Axis
13	AMP4-ENA	Output	Amplifier Enable U / A / S
14	AMP5-ENA	Output	Amplifier Enable U / A / S
15	AMP1-FLT	Input	Amplifier fault 1 X-Axis
16	AMP2-FLT	Input	Amplifier fault 2 Y-Axis
17	AMP3-FLT	Input	Amplifier fault 3 Z-Axis
18	AMP4-FLT	Input	Amplifier fault 4 U / A / S-Axis
19	AGND	Output	Ref. for command (analog) out
20	AMP5-FLT		Amplifier fault 5 V / B-Axis
21	DAC5A+		Analog Out V / B-Axis
22	DAC5A-		Analog Out V / B-Axis
23	NC		
24	Ext +24V	Input	External +24V
25	Ext GND	Input	External ground, "FIELDRETURN"

Amplifier Enables

The following diagram shows the amplifier enable and its corresponding power supply:



Amplifier Enable

Amplifier Enable Line Specifications

Parameter	Min	Max	Unit
Voltage range	12	24	V
Switching current		0.5	A

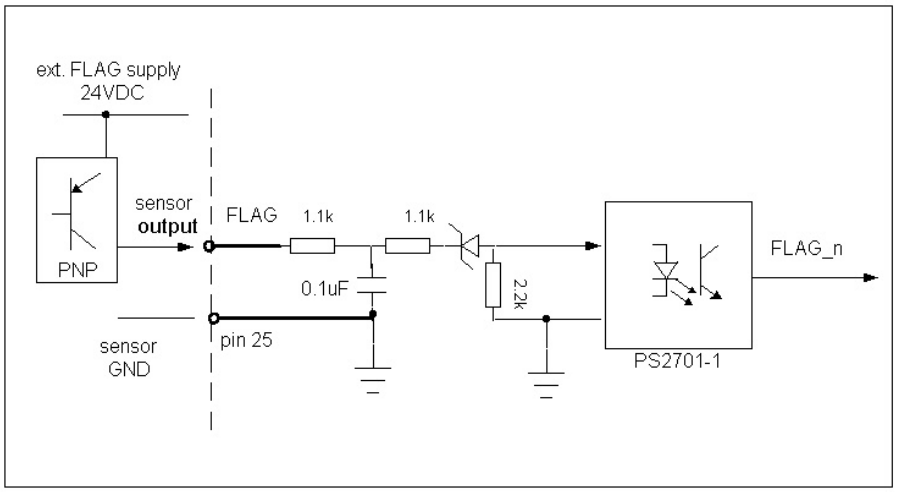
Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Amplifier Fault Inputs

The amplifier fault inputs are axis specific. The reference signal is located on AMP1 Pin 24.

- Servo and stepper axis can be mixed on the Adv 400.
- The signals for the steppers are located on connector STP1.
- Amplifier faults are motor specific, so they connect the faults to the corresponding connector.



Amplifier Fault Inputs

Electrical Specifications of Amplifier Fault Inputs

1- Signal voltage range	11-30 V
1-Signal current consumption	5-20mA
0- Signal voltage range	0-5 V or input not connected

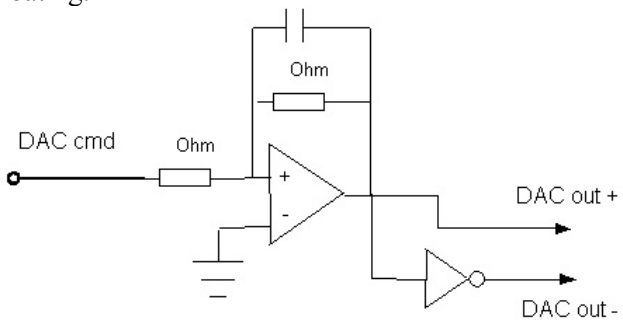
Analog Command Outputs (+/-10V)

Singled ended command output connection:

If the stepper drive is single ended, only connect command output DAC+ to the input of the drive. Connect analog AGND (Pin 9) to the drive's reference.

Differential command output connection:

If the drive has a differential command input driver, connect both DAC+ und DAC- to the input driver of the drive. Leave AGND floating.



Command Output

Specifications of Command Output Signals

Parameter	Min	Max	Units
Voltage range	- 10	10	V
Output current	-3	3	mA
Resolution	12 bit		

Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Flag Connector (FLG1)

This male connector has all axis specific FLAG inputs for five axes. Each axis has the following set of inputs:

- Positive end limit (+LIM)
- Negative end limit (-LIM)
- User input (User)
- Home input (HOME)

Switching devices can be mechanical switches or optical sensors.

Name of Connector: FLAG1

Position of Connector: See diagram

Connector Type: Male, D-Sub 25

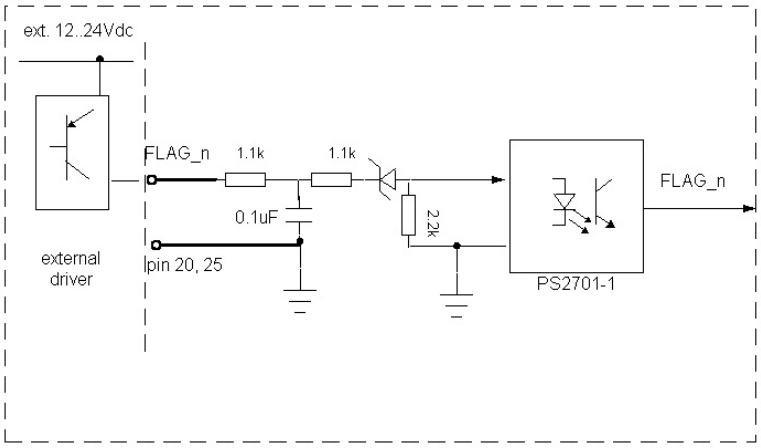
Cable Cross Section:

- Signal lines >=0.34mm2
- Power lines>=0.5mm2

FLG1			
Pin#	**Symbol**	**Function**	**Description**
1	USER1	Input	General Capture Flag **
2	PLIM1	Input	Positive Limit Flag **
3	MLIM1	Input	Negative Limit Flag **
4	HOME1	Input	Home Flag **
5	24VDC out		Field power supply 24 VDC
6	USER2	Input	General Capture Flag **
7	PLIM2	Input	Positive Limit Flag **
8	MLIM2	Input	Negative Limit Flag **
9	HOME2	Input	Home Flag **
10	24VDC out		Field power supply 24 VDC
11	USER3	Input	General Capture Flag **
12	PLIM3	Input	Positive Limit Flag **
13	MLIM3	Input	Negative Limit Flag **
14	HOME3	Input	Home Flag **
15	nc		Not connected
16	USER4	Input	General Capture Flag **
17	PLIM4	Input	Positive Limit Flag **
18	MLIM4	Input	Negative Limit Flag **
19	HOME4	Input	Home Flag **
20	GND out	Output	GND field power supply, flag ref
21	USER5	Input	General Capture Flag **
22	PLIM5	Input	Positive Limit Flag **
23	MLIM5	Input	Negative Limit Flag **
24	HOME5	Input	Home Flag **
25	GND out	Output	GND field power supply, flag ref

Note:

There are two 24VDC outputs on FLG1 to supply potential sensors. The 24VDC lines are put through from the external field power supply.



Electrical Specifications of Flag Inputs

1- Signal voltage range	11-30 V
1-Signal current range	5-20mA
0- Signal voltage range	0-5 V or input not connected

Stepper Connector (STP1)

This connector is used to connect up to four stepper drives. The stepper drives must have at least a pulse and direction interface to get proper data from the Adv 400. This connector has the four axis specific amp fault inputs.

- For stepper axis, the following signals are received:
  - One differential pulse signal
  - One differential direction signal
- Reference line (for all four) for pulse and direction signals
  - One amplifier fault line

Furthermore, this connector has the outputs EQU for four servo or stepper axis that switch to the actual encoder position.

Per axis, one compare equal output signal is received.

Name of the Connector: STP1
Position of the Connector: See diagram
Connector Type: female, D-Sub 25

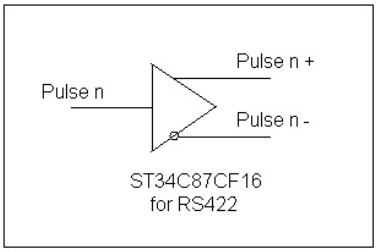
Cable Cross Section:

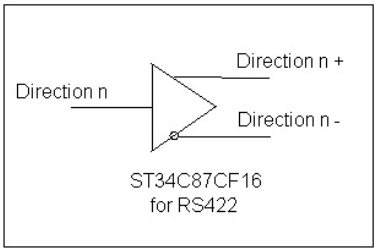
- Signal lines >=0.34mm2
- Power lines>=0.5mm2

STP1			
Pin#	**Symbol**	**Function**	**Description**
1	DIR_1+	Output	Direction +
2	DIR_1-	Output	Direction -
3	PUL_1+	Output	Pulse Output +
4	PUL_1-	Output	Pulse Output -
5	BEQU1	Output	EQU output
6	AMP1-FLT	Input	Amplifier fault **
7	DIR_2+	Output	Direction +
8	DIR_2-	Output	Direction -
9	PUL_2+	Output	Pulse Output +
10	PUL_2-	Output	Pulse Output -
11	BEQU2	Output	EQU output
12	AMP2-FLT	Input	Amplifier fault **
13	DIR_3+	Output	Direction +
14	DIR_3-	Output	Direction -
15	PUL_3+	Output	Pulse Output +
16	PUL_3-	Output	Pulse Output -
17	BEQU3	Output	EQU output
18	AMP3-FLT	Input	Amplifier fault **
19	DIR_4+	Output	Direction +
20	DIR_4-	Output	Direction -
21	PUL_4+	Output	Pulse Output +
22	PUL_4-	Output	Pulse Output -
23	BEQU4	Output	EQU output
24	AMP4-FLT	Input	Amplifier fault **
25	GND	Common	Reference for pulse and direction

Signals to Stepper Interface

The following diagram shows the pulse and direction interface:





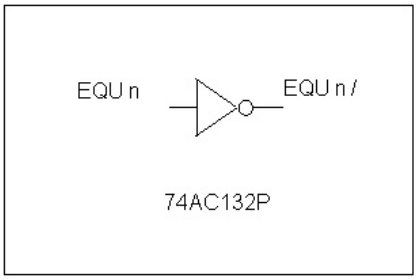
Driver RS422 for the Pulse and Direction Signals

Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

EQU Outputs

These outputs are fast (signal delay time 50 nsec on controller side) switching to the actual encoder position.



EQU Output Driver

Electrical Specifications of EQU outputs

1- Signal voltage range	0-2 V
1-Signal current consumption	5 mA
0- Signal voltage range	3-5 V or output open

The switching power of the EQU outputs is limited. An interface circuitry can be designed.

Encoder Connector Fifth Axis (HW1)

The connector HW1 is used to connect the fifth incremental encoder. This encoder can be from a fifth linear or rotative axis, but also can be an external hand wheel.

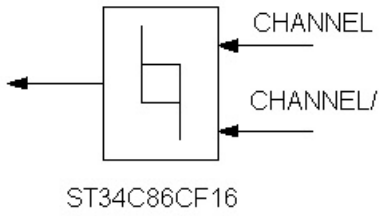
Connect encoders 1-4 to connectors Enc1-Enc4.

Name of the Connector: HW1
Position of the Connector: See diagram
Connector Type: female, D-Sub 15

Enc5 / HW1

Pin#	Symbol	Function	Description
1	CHA+	Input	Pos. A Chan. external HW
2	GND	Common	Digital Reference
3	CHB-	Input	Neg. B Chan. external HW
4	CHC+		
5	A+5V	Output	Digital Supply
6	NC		
7	NC		
8	NC		
9	CHA-	Input	Neg. A Chan. external HW
10	CHB+	Input	Pos. B Chan. external HW
11	GND	Common	Digital Reference
12	CHC-		Neg. C Chan. External HW
13	NC		
14	A+5V	Output	Digital Supply
15	NC		

Any signal type (e.g. A, A/) on the control box side is connected to a differential line driver:



Encoder Input Driver

Supported Encoder Types

Incremental encoders with two differentials A quad B Signals (RS422). Optional C- channel is supported.

Encoder Specifications

- Signal lines A, A/, B, B/, C, C/
- Max. Cycle output frequency 20MHz
- Current consumption <100mA
- Phase difference of A to B: 90 degree +/-30

Encoder Power Supply

The control box supplies the encoder with 5VDC via the HW1 connector.

The maximum current consumption of all consumers (i.e. the encoders connected to ENC1, ENC2, ENC3, ENC4 and HW1, pulse and direction drivers on STP1 and multiplexed IO boards connected to XX1) must not exceed 2A.

Encoder Connecting Cable

Warning:

Only connect encoders when controller is powered down.

The maximum cable length depends on the transmission frequency and the power consumption of the encoder:

Current Consumption	Frequency	Maximum Cable Length
<100mA	1MHz	10m
<100mA	2MHz	5m

Note:

Use only shielded twisted pair signal and power lines. Shield must be placed on the conductive housing of the connector.

Analog IO Connector (ANA1)

This connector has the signals for one analog (0 -10V) input and optional two inputs (+/-10V) and two analog outputs:

- One input 0 to 10V, 12-bit
- Two differential inputs (+/-10V) 12 bit, e.g. to connect analog sensors
- Two differential analog outputs (+/10V) — whereas the first one can be used for an optional fifth servo axis. Optional use as general-purpose output.

Name of the Connector: ANA1
Position of the Connector: See diagram
Connector Type: female, D-Sub 15

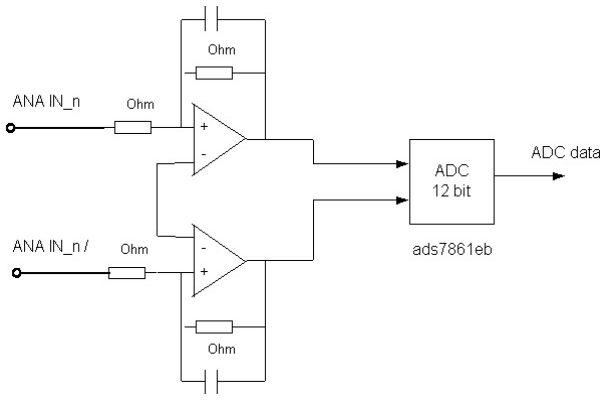
Cable Cross Section:

- Signal lines >=0.34mm2
- Power lines>=0.5mm2

ANA1			
Pin#	**Symbol**	**Function**	**Description**
1	ADCIN1 +	Input +/- 10V	Analog input 1 + (optional)
2	ADCIN1 -	Input +/- 10V	Analog input 1 - (optional)
3	ADCIN2 +	Input +/- 10V	Analog input 2 + (optional)
4	ADCIN2 -	Input +/- 10V	Analog input 2 - (optional)
5	ADCIN3 +	Input 0-10V	Analog Input 3 +
6	ADCIN3 -	Input GND	Analog input 3 -
7	DIR_5+	Output	Direction + Axis 5
8	PUL_1+	Output	Pulse Output + Axis 5
9	DAC5+	Output	Analog Out 5 +
10	DAC5-	Output	Analog Out 5 -
11	DAC6+	Output	Analog Out 6 +
12	DAC6-	Output	Analog Out 6 -
13	DIR_6+	Output	Not Implemented
14	PUL_6+	Output	Not Implemented
15	AAGND	Output	Reference for ADC/DAC signals

Analog Inputs

The following diagram shows the input circuitry principle of the analog inputs:



Analog Inputs

Electrical Specifications of Analog Inputs

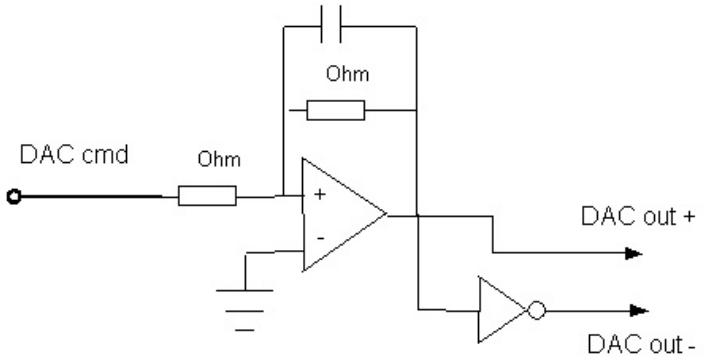
Parameter		Units/ note
Voltage range	-10-10	V
Resolution	12	Bits
Conversion rate	Servo cycle	Default 442usec

Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Analog Outputs

Outputs are referenced to pin 15, analog ground.



Output Circuitry of Analog Outputs

Electrical Specifications of Analog Outputs

Parameter	Min	Max	Units
Voltage range	- 10	10	V
Output current	-3	3	mA
Resolution	12 bit		

Note:

Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Analog IO Addressing

The analog IO has been pre-configured for use with the Advantage 400 unit. The M-variable definitions can be found in the definitions.h file and are as follows:

Description	M-Variable	Address
Analog Input 1 (ADCIN1)	M396	Y:$C0D6,8,12,S
Analog Input 2 (ADCIN2)	M397	Y:$C0D5,8,12,S
Analog Input 3 (ADCIN3)	M398	Y:$C0DE,8,12,S
Analog Output 5 (DAC 5)	M590	Y:$C0D4,8,16,S
Analog Output 6 (DAC 6)	M591	Y:$C0DC,8,16,S

Digital Input Connector (IN1)

Up to 32 optically isolated digital inputs can be connected to this connector. The inputs are grouped into 16 inputs.

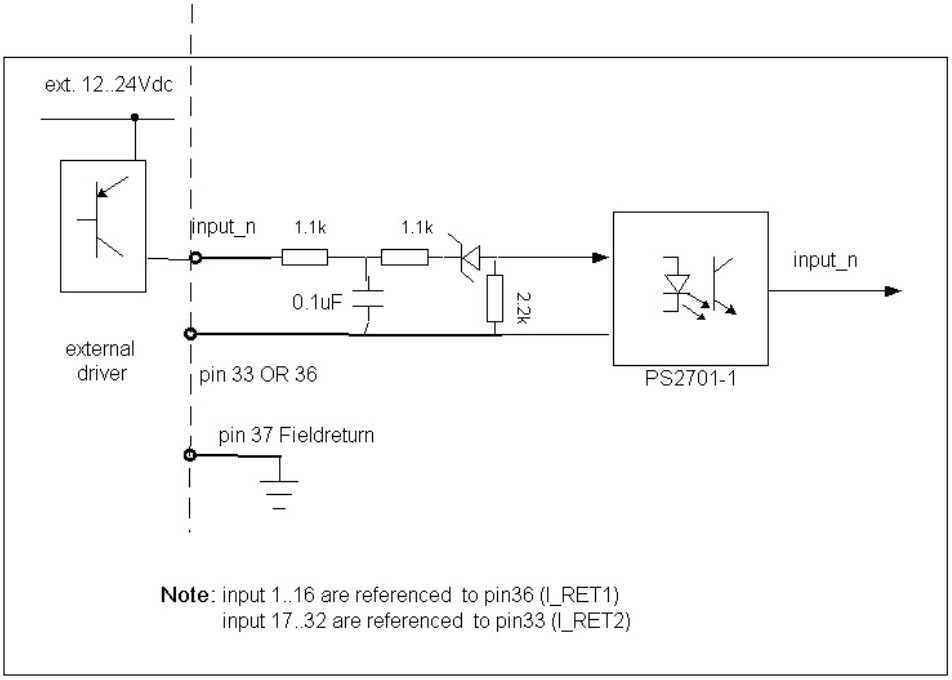
- Inputs 1-16 are referenced to pin 36.
- Die inputs 17-32 are referenced to pin 33.

Name of the connector: IN1
Position of the connector: See View 2 -4
Connector type: male, D-Sub 37

Cable cross section:

- Signal lines >=0.34mm2
- Power lines>=0.75mm2

IN1			
Pin #	**Symbol**	**Function**	**Description**
1	Input1	Input	Digital input 1, group 1
2	Input2	Input	Digital input 2, group 1
3	Input3	Input	Digital input 3, group 1
4	Input4	Input	Digital input 4, group 1
5	Input5	Input	Digital input 5, group 1
6	Input6	Input	Digital input 6, group 1
7	Input7	Input	Digital input 7, group 1
8	Input8	Input	Digital input 8, group 1
9	Input9	Input	Digital input 9, group 1
10	Input10	Input	Digital input 10, group 1
11	Input11	Input	Digital input 11, group 1
12	Input12	Input	Digital input 12, group 1
13	Input13	Input	Digital input 13, group 1
14	Input14	Input	Digital input 14, group 1
15	Input15	Input	Digital input 15, group 1
16	Input16	Input	Digital input 16, group 1
17	Input17	Input	Digital input 1, group 2
18	Input18	Input	Digital input 2, group 2
19	Input19	Input	Digital input 3, group 2
20	Input20	Input	Digital input 4, group 2
21	Input21	Input	Digital input 5, group 2
22	Input22	Input	Digital input 6, group 2
23	Input23	Input	Digital input 7, group 2
24	Input24	Input	Digital input 8, group 2
25	Input25	Input	Digital input 9, group 2
26	Input26	Input	Digital input 10, group 2
27	Input27	Input	Digital input 11, group 2
28	Input28	Input	Digital input 12, group 2
29	Input29	Input	Digital input 13, group 2
30	Input30	Input	Digital input 14, group 2
31	Input31	Input	Digital input 15, group 2
32	Input32	Input	Digital input 16, group 2
33	I_RET2	Input	Ref for group 2 inputs
34	NC		Not connected
35	NC		Not connected
36	I_RET1	Input	Ref for group 1 inputs
37	Ext GND	Input	Ref for external field supply



Digital Input Circuitry

Electrical Specifications of Digital Input

1- Signal voltage range	11-30 V
1-Signal current consumption	5-20mA
0- Signal voltage range	0-5 V or input open

Digital Output Connector (OUT1)

Up to 16 digital general-purpose outputs can be connected to this connector.

These outputs are optically isolated and grouped into two sets. They can drive up to 0.5A. These sets can either have one or two power supplies.

The following signals are found on OUT1:

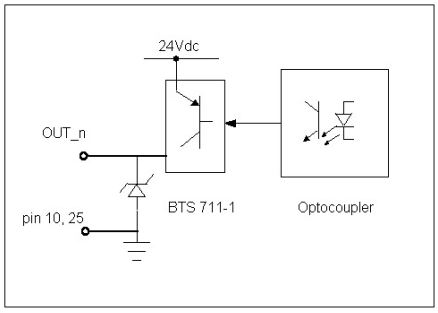
- Digital outputs 1-8
- Power supply for outputs 1-8
- Digital outputs 9-16
- Power supply for outputs 9-16
- Two field power return lines

Name of the Connector: OUT1
Position of the Connector: See diagram
Connector Type: male, D-Sub 25

Cable cross section:

- Signal lines >=0.34mm2
- Power lines>=0.75mm2

OUT1			
Pin #	**Symbol**	**Function**	**Description**
1	OUTPUT1	Output	Digital output 1
2	OUTPUT2	Output	Digital output 2
3	OUTPUT3	Output	Digital output 3
4	OUTPUT4	Output	Digital output 4
5	OUTPUT5	Output	Digital output 5
6	OUTPUT6	Output	Digital output 6
7	OUTPUT7	Output	Digital output 7
8	OUTPUT8	Output	Digital output 8
9	Ext +24V	Input	External power supply 24VDC
10	Ext GND	Input	Ref, field return- ext. Power supply
11	NC		Not connected
12	NC		Not connected
13	NC		Not connected
14	NC		Not connected
15	NC		Not connected
16	OUTPUT9	Output	Digital output 9
17	OUTPUT10	Output	Digital output 10
18	OUTPUT11	Output	Digital output 11
19	OUTPUT12	Output	Digital output 12
20	OUTPUT13	Output	Digital output 13
21	OUTPUT14	Output	Digital output 14
22	OUTPUT15	Output	Digital output 15
23	OUTPUT16	Output	Digital output 16 * (see remark)
24	Ext +24V	Input	External +24V
25	Ext GND	Input	External field ground
*Output 16 is used as Drive enable in 5-Axis configuration.			



General Digital Outputs (OUT1)

Electrical Specifications of Outputs

1- Signal voltage range	Supply voltage
1-Signal current consumption	Max 0.5 A, typical 5mA-0.3A
0- Signal, maximum leakage current	2mA

The power supply voltage can range between 12 and 24VDC. If all 16 outputs are powered by one power supply, the references of the two sets must be connected to the supply reference. If inductive loads are driven, make sure that they have a quench diode in parallel to it.

MUX IO Connector (XX1)

This IDC header for MUX IO gives the option to expand the digital IO capability of the controller. Usually, Delta Tau's MUX IO boards (like ACC-34AA) are connected here.

> ***Note:***
>
> Only use shielded twisted pair signal lines. Put shield on conductive part of connector.

Name of the Connector: XX1
Position of the Connector: See diagram
Connector Type: IDC header, 26 pin

CAN- Interface (CAN)

This connector is used for an optional CAN bus interface. Call Delta Tau Europa AG for details.

Name of the Connector: CAN
Position of the Connector: See diagram
Connector Type: female, D-Sub 9

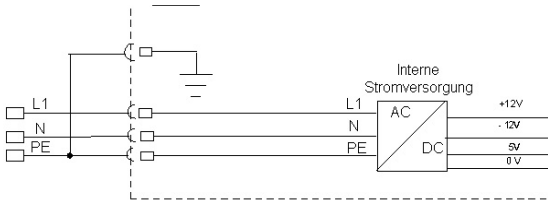
POWER SUPPLIES

The Adv 400 must be supplied by at least two power supplies. Besides the AC/DC power supply to supply the internal logic power, a field power supply must be connected to the machine peripheral.

Internal Logic Power Supply

The internal AC/DC power supply is integrated into the control box already and must be connected to the following connector:

Name of the Connector: AC Power Input
Position of the Connector: See diagram
Connector Type: Gerätebuchse



AC/DC Interface

Electrical Specifications of AC/DC Power Supply

Parameter	Range	Unit
Input voltage	85-264	VAC
	120-300	VDC
Nominal power	40	W
Nom. Current consumption	2	Arms
Inrush current	<18	Arms

External Power Supply

A field power supply (not included in the package) with 12-24VDC must be connected in order for the amplifier enable and the digital output to work properly.

It supplies the following outputs in detail:

- Amplifier enable lines 1-4 on AMP1
- Both sets of digital general-purpose outputs on OUT1.

Electrical Specifications for Field Power Supply

Parameter	Range	Units
Input voltage	12-24	VDC
Current consumption	>10	A

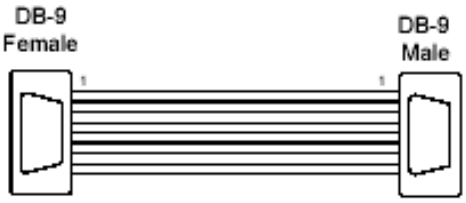
COMMUNICATION INTERFACES

RS232

This port communicates directly with PMAC2A PC 104 from an external PC using Delta Tau's terminal program family Pewin.

- Variables, parameter program download
- Uploads of parameters, programs for data backup
- Axis PID tuning

The serial cable should be shorter than 15m. The following cable pinout is suggested:



PMAC (DB-9S)	PC (DB-9)
1 (No connect)	1 (No connect)
2 (TXD/)	2 (RXD)
3 (RXD/)	3 (TXD)
4 (DSR)	4 (DTR)
5 (Gnd)	5 (Gnd)
6 (DTR)	6 (DSR)
7 (CTS)	7 (RTS)
8 (RTS)	8 (CTS)
9 (No connect)	9 (No connect)

RS232 cable

DTR and DTS are hardwired on the controller side. These signals must be connected in order for the Pewin PRO to work properly.

USB Interface

- Supported by Windows CE
- Used to connect keyboard, mouse, floppy, etc.
- Data exchange with controller

Ethernet (Optional)

- Supported by Windows CE
- Data exchange with controller