

EUROTHERM
DRIVES

ELECTRICAL ENCODER AND 5902

PRODUCT MANUAL

HA385749

Issue 2

WARNING

NEVER WORK ON THE CONTROLLER, MOTOR, OR AUXILIARY EQUIPMENT WITHOUT FIRST ISOLATING ALL SUPPLIES TO THE SYSTEM.

CONTROLLER WARRANTY

For further details on Eurotherm Drives Controller Warranty and Repair refer to the Standard Conditions of Sale IA058393C

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INTRODUCTION

In order to provide high resolution speed feedback from an incremental encoder a receiver card and Line Driver have been added to the standard Eurotherm Drives product range. These products complement the fibre optic Microtach offered by Eurotherm Drives and allow the user to use either a Eurotherm Drives pulse encoder or, any appropriate proprietary encoder so long as the 5902 Line Driver is used. The 5902 Line Driver not only provides a 15V differential (88C30) signal needed for long distance transmission but also an isolated power supply compatible with most encoders supply voltages. This product together with the receiver option card allows standard encoders to work in industrial environment where a high level of electrical noise exists. Most standard encoders are very sensitive to electrical noise and may result in speed variations, phase loss and in extreme cases "SPEED FEEDBACK ALARMS." The Eurotherm Drives Encoder offers a high immunity device with known performance and thus is recommended in cases where microtachs are not being used. Obviously by their nature the fibre optic microtach is completely immune to electrical noise over the length of the transmission system although repeaters are required if transmission distances exceed 40m. All these systems have been designed and tested to the EEC directive IEC 801 parts 3.

Using any of these systems will allow noise free transmission even in the most severe industrial environment.

Summary of Recommended Usage

1. Microtachs	These should be used in standard applications where the transmission distances does not exceed 40m. Distances above this are achievable but repeaters need to be used. This is also the preferred system when operating with 5720 products etc. Eurotherm Drives Fibre Optic composite cable can be used for connection outside the control panel.
2. Eurotherm Drives Encoder	Again these should be used in standard applications where the customer feels more comfortable with wire based systems. The maximum transmission distance will be fixed by your maximum speed and encoder lines per rev. As a guide this would be 100m at 6000rpm and 1000m at 600rpm with a 1000 line encoder. Screened cable must be used and properly terminated.
3. Encoder + 5902 Linedriver	This system should only be used when Eurotherm Drives non approved encoders are used for example where mechanical constraints exist, etc. Again transmission distances are limited in the same fashion as above. Screened cable must be used and properly terminated.

EUROTHERM DRIVES APPROVED ENCODERS

Heidenhain:

ROD 534.1013

Avtron:

M945 1 R 1000 B C 15

EUROTHERM DRIVES ENCODER SPECIFICATION

Mechanical Specification

Dimensions	See Drawing over
Weight	approx 650g
Starting torque (25 C)	0.007Nm max
Slewing speed max	6000rpm
Shaft loading	
axial	110N
radial	130N
Rotor inertia	$3.6*10^{-6}Nms^2$

Environmental Characteristics

Temperature	
Operating	0°C to +70°C
Storage	-25°C to 80°C
Humidity	up to 98% RH
Protection	IP64
Shock	20G, for 11ms duration
Vibration	10G, 5-2000Hz

Materials Used

Mainframe	Aluminium
Housing	Cast Aluminium
Shaft	Anti-magnetic stainless steel
Bearing	ABEC 5
Light source	GaAlAs Infrared light emitting diode

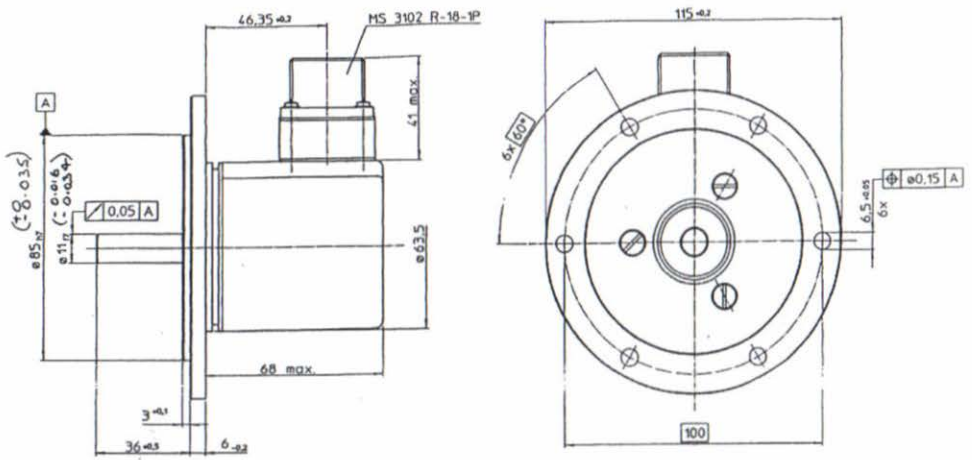
Electrical Specification

Supply voltage	8-15Vdc
Current consumption	180mA max
Frequency range	300KHz
Lines per rev	1000
Output format	15V differential with 90° Quadrature and zero index, 88C30 Line Driver.
Max load per output channel	50mA
Max period distortion	45°
Max quadrature distortion	45°
Max rise/fall time at 10v	150ns

ENCODER OUTLINE DRAWING

DO NOT SCALE | THIRD ANGLE PROJECTION | GENERAL DRAWING PRACTICE TO BS 308/ BS 3939

'S	DATE
A	18/3/92
1	24392
2	3/7/92



NOTES:
1. ENCODER TO BE SUPPLIED WITH LABEL SHOWING SSD PART N° DD385536D010, SERIAL NUMBER & DATE CODE.
2. ENCODER TO BE SUPPLIED WITH 4n7 CAPACITOR FITTED BETWEEN PIN 'J' AND ENCODER CASE, EXISTING CONNECTION TO BE BROKEN.
3. ALL OTHER ELECTRICAL & MECHANICAL DETAILS AS LITTON ENCODER G71SCLDB11000-531
4. LITTON SPECIAL BUILD REFERENCE G71SCLDB11000-531-15EA APPLIES
5. OUTPUT RESOLUTION 1000 PULSE PER REV
6. ENCODER TO BE SUPPLIED WITH CONNECTOR MS 3106A-18-1S

Signal	Pin
channel A	A
channel B	B
zero-signal	C
Vcc	D
Vcc sensor	E
0 volts	F
channel A	G
channel B	H
zero-signal	I
case GRD	J

DRAWN BA	MATERIAL SEE NOTES	DIMS. IN M.M. APPLY OVER FINISH (EXCEPT FOR PAINT AND LACQUER)	ASSEMBLED ON —
CHECKED GDR		GENERAL TOLERANCE X ±0.4, XX ±0.2, XXX ±0.1, HOLES ±0.07 mm, -0.02 -0.07	SCALE N.T.S
DESIGN APPROVAL	FINISH SEE NOTES	SSD LITTLEHAMPTON, ENGLAND TELEX 87142	TITLE ENCODER G71 WITH ADAPTOR FLANGE OUTLINE DRAWING
MGMT APPROVAL		EI	DRAWING NUMBER DD385536D010 SHT 1 OF 1

RECEIVER SPECIFICATION

The receiver card is a plug on option to the 590 series of Eurotherm Drives products, and is an alternative to the Microtach Option Card. The card contains a fixed voltage isolating power supply, 2 optically isolating receive channels (A and B) and decoding logic. This isolating power supply and receive circuits prevent earth loops being formed and provide good noise immunity.

Output Voltage

This can be set by a programming resistor on the actual PCB. The relationship between output voltage and resistor value is as follows:-
R19 = ((8200*Vout) - 20500)/(24.3 - Vout)
Standard options available are:-

PART NUMBER	VOLTAGE	RESISTOR VALUE
AH385436U001	24V dc Isolated	Not fitted
AH385436U005	5V dc Isolated	1K2Ω
AH385436U012	12V dc Isolated	6K8Ω
AH385436U015	15V dc Isolated	12KΩ

Output current

This is determined by the power supply capability of the host and which other ancillaries are connected to the 24V of this host. See POWER BUDGET section, valid to a maximum of 5W.

Power consumption
1.4 times output power

Maximum pulse rate

100KHz

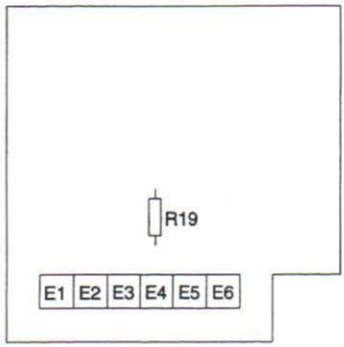
Receiver current

10 mA / channel

Input Format

Single Ended with Quadrature, A positive with respect to A complement, 3.5V minimum.
Or
Differential with Quadrature, 3.5V minimum.

Terminal Description



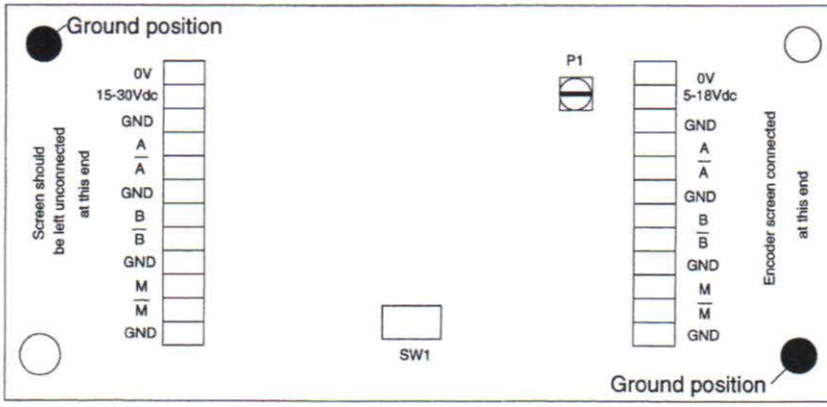
E1. 0V (isolated)
E2. 15V (isolated)
E3. A channel
E4. A complement
E5. B channel
E6. B complement

5902 LINE DRIVER SPECIFICATION

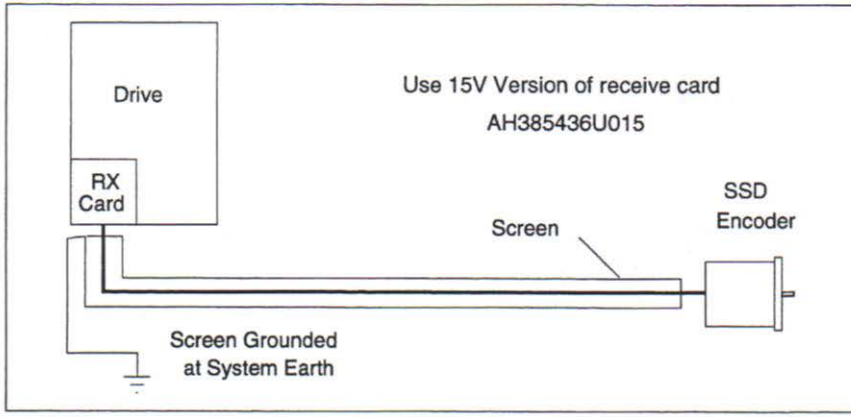
The 5902 Line Driver is intended to isolate non Eurotherm Drives approved encoders from both radiated and conducted electrical noise which is present in most industrial environment as well as acting as a buffer for these encoders. This scheme works by assuming that the noise will be present in the long cable run which can exist between an encoder and the receive circuits, thus for this scheme to work the Line Driver must be placed close to the encoder it is protecting (typically 1m).
Other features of this Line Driver are :-

1. Variable Voltage power supply (5-18Vdc) suitable for most encoders, adjustable via P1, clockwise to increase voltage.
2. Variable / fixed zero index pulse width, selectable via switch 1. This feature allows either the actual zero index pulse to be transmitted or a fixed pulse of 10us on the rising edge of the actual zero index pulse. This would be used to condition signals from electric eyes / magnetic pickups etc. where the signal is ill defined or of an extremely long duration compared to that of the A and B pulse trains.

Input voltage	15-30Vdc (polarity protected.)
Power Consumption	1Watt plus 1.4 times encoder consumption
Encoder Voltage	5-18Vdc (User adjustable.)
Encoder Consumption	2W Maximum
Input Format	As with the receiver card For single ended operation A must be positive with respect to A complement and B with respect to B complement.
Output Format	15V differential (88C30)
Transmission Distance	100m at 100Khz 1000m at 10KHz
Box dimensions	Length 175mm, width 80mm, height 57mm
Fixing holes	Length 163mm, width 52, size 4.3mm
Gland hole diameter	21.4mm

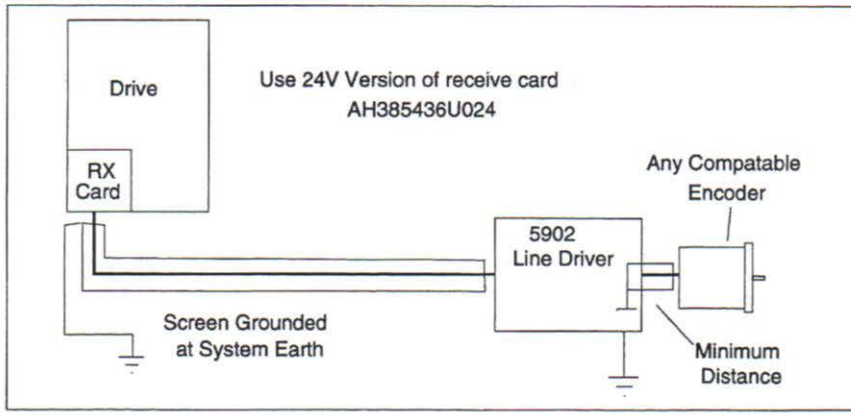


CONNECTION DIAGRAM FOR EUROTHERM DRIVES ENCODER



Connection to the 590 series of products is made via a plug in option card AH385436. It is recommended that the screen be connected to system ground at the cubical terminal rail. For installations which do not have this, connection should be made via 1.5mm wire to the system star earth point. Trouble free operation can only be guaranteed if these instructions are followed.

CONNECTION DIAGRAM FOR 5902 LINE DRIVER



This system is to be used when a non Eurotherm Drives approved encoder is used. The 5902 should be mounted as close as possible to the encoder (typically within 1m). The screen for the encoder should be earthed at the 5902 only if not connected to the encoder body. If an earth connection is required then the appropriate terminals should be used to terminate the screen and the PCB fixing screw should be in the ground position. Connection to earth at both the encoder and Line Driver may cause earth loops to be formed which are undesirable in transmission systems. On the connection between the 5902 and the receiver the screen should be left open at the 5902 end and connected to the system star point at the receive end. The terminals on the drive side of the 5902 can be used to terminate the screen as long as the PCB fixing screw is not in the ground position.

EUROTHERM DRIVES ENCODER CONNECTION

FUNCTION	MS CONNECTOR PIN	RECEIVER TERMINAL
Channel A	A	3
Channel A Comp.	G	4
Channel B	B	5
Channel B Comp.	H	6
Marker	C	
Marker-Comp.	I	
Vcc supply	D	2
Vcc sensor (not used)	E	
0 Volts	F	1
0 Volts sensor (not used)	-	
Cable screen	J	

CABLE SPECIFICATION

Eurotherm Drives recommend screened cable to be used in all systems using electrical encoders. Either cable with an overall screen or a screen over each individual pair may be used. Connection to earth should always be made at the receive end ONLY, and should be in a star configuration

Cable Recommendation

Eurotherm Drives Part Number	CM052666 (3 pairs individually screened)
Belden Equivalent	8777

Power Budget

Power available from host = 6.4 W

Power Consumption

Serial Link	1.2 Watt
External Relays etc	1.2 Watts
5703	2.5 Watts
5902	1 Watt plus 1.4 times Encoder Consumption.
Receiver Card	1.4 times 5902 Consumption

In cases where there is not enough power available to satisfy all the demands an external power supply should be used. This power supply should be 15 - 24V dc at the required rating and be isolated from earth, i.e. neither the 0V or +V should be connected to earth.

ISS.	MODIFICATION	CP.NO.	DATE	APPROVAL
1	Initial Issue	7666	11.06.1992	GDR
2	Corrected Voltage Option Table ,New Address Added & DD385536D010 Now iss 2	8886	17.01.1994	GDR

FIRST USED ON		MODIFICATION RECORD Electrical Encoder & 5902 Product Manual	
EUROTHERM DRIVES	LITTLEHAMPTON ENGLAND TELEX 87142	DRAWING NUMBER ZZ385749C	SHT. 1 of 1 SHT

SALES AND SERVICE

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