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# NEWALL

**Newall Measurement Systems**

***SHG-AF Series***  
***(Spherosyn Absolute)***  
***Linear Encoder***



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## Fanuc Serial Protocol

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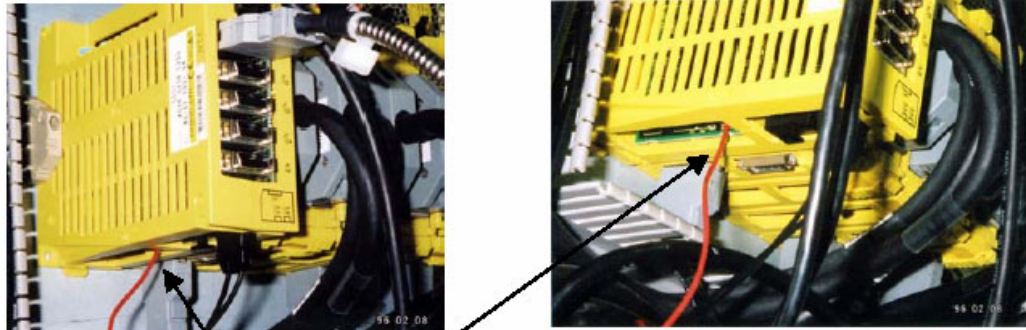
# SHG-AF SERIES (SPHEROSYN ABSOLUTE) LINEAR ENCODER WITH FANUC SERIAL INTERFACE

(Revision 01.04.05)

## REQUIREMENTS

Fanuc CNC control with SDU1 encoder interface module.

Ensure the ground terminal connection on the SDU1 module is connected to the machine ground or equipotential terminal.



Ground Wire Connection

**Note:** There is a screw terminal connection on the main PCB of the Encoder interface module that should be connected to Ground. If not then the display may show jitter (instability), particularly when the machine is in E-STOP.  
(Grounding of the module is not detailed in the Fanuc installation instructions. See Fanuc drawing No: A-65434EN for details).

It is recommended that 'n-pulse suppression' is enabled (set to 1)

## SPECIFICATION

Power Requirements	5Vdc +-5% < 350mA
Shock (11ms)	100g / 980m/s-2 (IEC 69-2-6)
Vibration (55-2000Hz)	30G / 294m/s-2 (IEC 68-2-27)
Ingress Protection Level	IP67
Operating Temperature Range	0 to 55 deg. C (32 to 131 deg. F)
Storage Temperature Range	-20 to 70 deg. C (-4 to 158 deg. F)
Scale Material	316 Grade Stainless Steel
Scale (Tube) OD	15.25mm (0.601")
Moving Force	20N
Standard Cable	15-core Cable with PUR
Max Cable Length	20m (65ft)
Cable Bend Radius (PUR)	Static: 12.7mm (0.5") Active: 50.8mm (2")
Cable Bend Radius with Armor	50.8mm (2")

## CONNECTIONS

Function	Colour	Pin (Honda PCR-E20FA)
Fanuc RQ+	Light Green	5
+5VDC	Black	9, 18, 20
Fanuc RQ-	Light Green + White	6
Fanuc Data+	Brown	1
Fanuc Data-	Brown + White	2
0V	White	12, 14, 16
PC	Orange	12

Connector used is part number: PCR-E20FA by Honda Tsushin Kogyo

## SIGNAL LED

The status of the encoder is shown by the Signal LED. On power up the Signal LED is red to indicate that the absolute position is being acquired, and then after a short time interval changes to green to indicate that valid position data is available.

During normal operation the signal LED changes to red if an error is detected.

## ALARM SIGNAL DESCRIPTIONS

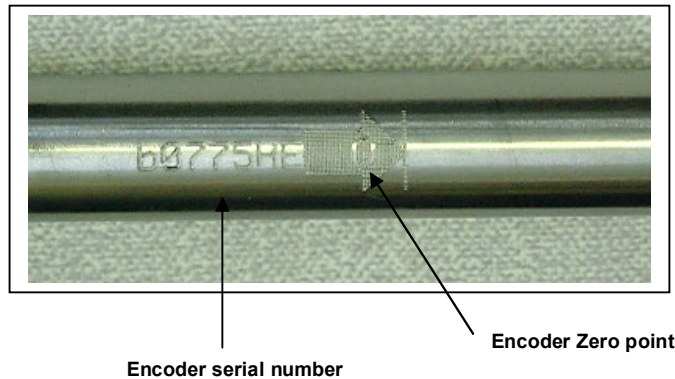
The Spherosyn Absolute Encoder can activate three types of alarm signal: Phase Alarm, Count Miss Alarm, and Pulse Miss Alarm. The conditions necessary to activate these alarms are described in the table below.

ALARM LINE	ALARM	ALARM TYPE	FANUC ALARM DESCRIPTION	NEWALL ALARM DESCRIPTION	NEWALL ALARM FLAGS
B7	OHAL	Over heat alarm.	Temperature in the encoder is too high.	Not implemented – always inactive.	All zero.
B6	LDAL	LED alarm.	LED is not working.	Not implemented – always inactive.	All zero.
B5	BLAL	Battery low alarm.	Battery voltage is low.	Not implemented – always inactive.	All zero.
B4	PHAL	Phase alarm.	Miss detection occurs by noise or other causes.	Activated by a discrepancy between the accumulated pitch number and the continuously sampled pitch number obtained from the hall sensors during slow traverse speeds.	02(hex).
B3	CMAL	Count miss alarm.	Absolute position is abnormal by miscounting position.	Not implemented – always inactive.	All zero.
B2	BZAL	Battery zero alarm.	Battery voltage had been lower than minimum operating voltage.	Not implemented – always inactive.	All zero.
B1	PMAL	Pulse miss alarm.	Trouble is detected in the interpolation circuit by noise or other causes.	1. Activated by detection of an invalid pitch count that is sampled on power up. 2. Activated by an error in the accumulated pitch number that is continuously updated. 3. Activated by travelling below the scale zero position.	04(hex) power up.  01(hex) pitch no. error  01(hex) pitch no. error.
B0	PCAL		Logical sum (OR) of B7(overheat) and B1(pulse miss).	PCAL is activated by the logic sum of all of the other alarms (b1 to b7)	04(hex) power up.

## ZERO POINT MARKER

The scale is marked with an arrow and a line at the position where the position data is zero. This point is 55mm in from the end of the scale.

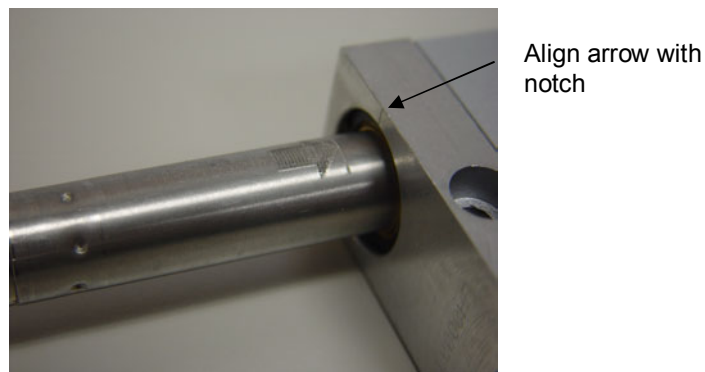
If the encoder travels between the end of the scale and the zero point (below zero) then the position data remains fixed at zero. Assuming that the RQ and data lines are connected to the Fanuc control, the LED on the front of the encoder changes from green to red and the Count Miss alarm is activated to indicate that the encoder is positioned below zero. The Count Miss alarm can be cleared by issuing an alarm reset when the encoder is positioned at zero or above.



## INSTALLATION

Install the scale and reader head hardware as described in the Spherosyn Absolute (SHG-A\_), Distance Coded (SHG-TC), and Digital SP (SHG-TS & SHG-VS) Encoder Hardware Installation Manual (Code LEHM).

It is important to ensure that the scale and reader head are rotationally aligned before operation. There is an arrow etched into the tube that needs to be aligned with the notch in the reader head. Once aligned the scale brackets are tightened as detailed in the installation manual.



Apply power to the reader-head. The Signal LED on the front of the reader-head will go RED and then GREEN as it establishes position and performs its self-diagnostics.

Move the reader-head along the full length of travel from the scale (taking care not enter the extreme 50mm at either end of the scale). The reader-head LED should stay GREEN during the full period of movement. If the LED changes to RED then the scale is not correctly aligned. If this occurs loosen the scale and rotate the scale in the brackets by approximately 2-3 degrees. Secure the scale and repeat the process until the signal LED remains GREEN for the full period of travel. Your installation is now complete.

## **NEWALL MEASUREMENT SYSTEMS**

Technology Gateway . Cornwall Road . South Wigston  
Leicester . LE18 4XH . England  
Tel: (+44) 0116 264 2730 . Fax: (+44) 0116 264 2731  
E-mail: [sales@newall.co.uk](mailto:sales@newall.co.uk)

## **NEWALL FRANCE SARL**

63 Rue Victor Hugo . F-59200 . Tourcoing . France  
Tel: 03 20 01 03 13 . Fax: 03 20 26 13 41  
E-mail: [sales@newall.co.uk](mailto:sales@newall.co.uk)

## **NEWALL ELECTRONICS INC**

1778 Dividend Drive . Columbus . Ohio . 43228. USA  
Tel: (+1) 614 771 0213 . Fax: (+1) 614 771 0219  
E-mail: [sales@newallusa.com](mailto:sales@newallusa.com)

Website: [www.newall.com](http://www.newall.com)