NOTES:

1. CONNECTOR, HEADER, BOARD TO BOARD, 12 CONTACTS
   MOLEX# 501594-1211 (MATING CONNECTOR MOLEX# 501591-1211).
   REFER TO MANUFACTURING SPECIFICATION SHEET ON STACKING HEIGHTS AND REQUIREMENTS.

2. CONNECTOR, ZIF, FFC/FPC, FLIP TOP ACTUATOR, HORIZONTAL MOUNTING, 0.5mm PITCH, 10 CONTACTS
   HIROSE ELECTRIC CO# FH33-10S-0.5S(10). REFER TO MANUFACTURER SPECIFICATION SHEET FOR FPC/FFC CONSTRUCTION.
NOTES:
1. PILT CAN BE SUPPLIED IN INDIVIDUAL PIECES OR IN CONTINUOUS FORM.
2. FOR ALTERNATE INDEX LOCATIONS, MULTIPLE INDEXES OR ADDITIONAL FEATURES; CONTACT MICROE.

<table>
<thead>
<tr>
<th>Length</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10mm - 500mm</td>
<td>-0 / +2mm</td>
</tr>
<tr>
<td>501mm - 1000mm</td>
<td>-0 / +5mm</td>
</tr>
<tr>
<td>1001mm - 5000mm</td>
<td>-0 / +13mm</td>
</tr>
<tr>
<td>&gt; 5000mm</td>
<td>-0 / +15mm</td>
</tr>
</tbody>
</table>

Optira Tape Scale Tolerance

---

MicroE
Micro-Engineering
125 Middlesex Tpke.
Bedford, MA 01730

NOTES:
1. PILT CAN BE SUPPLIED IN INDIVIDUAL PIECES OR IN CONTINUOUS FORM.
2. FOR ALTERNATE INDEX LOCATIONS, MULTIPLE INDEXES OR ADDITIONAL FEATURES; CONTACT MICROE.
DIRECTION "A"

\[ \phi 16.50 \] 
SCALE O.D.

\[(\phi 12.73)\]
OPTICAL DIAMETER

MACHINE AXIS

POSITION TRACK
(2,000 COUNTS)

\[ \phi 2.00 \pm 0.010 \]
HUB I.D.

\[ 1.02 \pm 0.10 \]
PCB THICKNESS

\[ 3.0 \pm 0.050 \]
HUB THICKNESS

\[ 1.00 \pm 0.03 \]
HUB RELIEF

\[ 2.307 \pm 0.150 \]
SCALE THICKNESS

\[ 2.29 \pm 0.05 \]
SCALE THICKNESS

\[ 0.48 \]
READHEAD FLY HEIGHT

\[ 2X1.70 \]

\[ 2X \phi 1.78 \]
THRU ALL

\[ 1.78 \]

\[ 3.17 \]
MOUNTING SURFACE

\[ 13.00 \]

\[ 8.00 \]

\[ 2.50 \]

\[ (5.1) \]

\[ (7.4) \]

\[ (5.6) \]

\[ 1.00 \]
HUB O.D.

\[ 2.00 \]
HUB I.D.

\[ 13.43 \pm 0.10 \]

\[ 13.00 \]

\[ 2.00 \]
MACHINE AXIS

\[ (2,000 COUNTS) \]
POSITION TRACK

\[ 3X M1.4X0.3 - 6H \]
THRU ALL

\[ EQ. SPACED ON A \]
\[ \phi 4.10 B.C. \]

\[ 16.50 \]
SCALE O.D.

\[ (\phi 12.73)\]
OPTICAL DIAMETER

\[ 1.02 \pm 0.10 \]
PCB THICKNESS

\[ 3.0 \pm 0.050 \]
HUB THICKNESS

\[ 1.00 \pm 0.03 \]
HUB RELIEF

\[ 2.307 \pm 0.150 \]
SCALE THICKNESS

\[ 2.29 \pm 0.05 \]
SCALE THICKNESS

\[ 0.48 \]
READHEAD FLY HEIGHT

\[ 2X1.70 \]

\[ 2X \phi 1.78 \]
THRU ALL

\[ 1.78 \]

\[ 3.17 \]
MOUNTING SURFACE

\[ 13.00 \]

\[ 8.00 \]

\[ 2.50 \]

\[ (5.1) \]

\[ (7.4) \]

\[ (5.6) \]

\[ 1.00 \]
HUB O.D.

\[ 2.00 \]
HUB I.D.

\[ 13.43 \pm 0.10 \]
DESCRIPTION:

3rd ANGLE PROJECTION

**SCALE:**

**SIZE DWG. NO. **

**SHEET 2 OF 6**

**REV.**

**INTERFACE, OPTIRA SERIES ENCODERS, 20um ROTARY GLASS SCALES W/HUBS**

(PIRG2010-HN)

**THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF Novanta Corporation AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR MANUFACTURE OR SALE OF APPARATUS WITHOUT EXPRESS WRITTEN AUTHORIZATION FROM Novanta Corporation.**

**DIMENSIONS:**

- **MACHINE AXIS**
- **POSITION TRACK** (2,500 COUNTS)
- **SCALE PATTERN SURFACE**
- **READHEAD FLY HEIGHT**
- **STATUS LED**

**DIMENSIONS IN MILLIMETERS:**

- **OPTICAL DIAMETER**
- **SCALE O.D.**
- **HUB O.D.**
- **HUB I.D.**
- **PCB THICKNESS**
- **SCALE THICKNESS**
- **HUB THICKNESS**
- **HUB RELIEF**
- **HUB RELIEF**
- **FLY HEIGHT**
- **READHEAD**
- **MOUNTING SURFACE**

**UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS.**

**DEVIATION AFTER PROCESSING:**

**TOLERANCES ARE:**

- **DEVIATIONS:**
  - **AXIAL:** ±0.010
  - **ANGULAR:** ±0.000

**DIM APPLY AFTER PROCESSING**

**INTERPRET ALL GEOMETRIC TOLs.**

**PER ANSI Y14.5M-1982 TOLERANCES ARE:**

- **DECIMALS:**
  - **ANGULAR:** ±30 MIN.
  - **AXIS:** ±0.13

**DIMENSIONS:**

- **3X Ø 1.60 THRU ALL**
- **Ø 2.90 ± 1.40**
- **EQ. SPACED ON A Ø 5.50 B.C.**
- **3X Ø M1.6X0.35 - 6H THRU ALL**
- **EQ. SPACED ON A Ø 5.50 B.C.**
- **2X 1.70**
- **2X Ø 1.78 THRU ALL**
- **15.03±0.10**
- **5.66±0.10**
- **13.00**
- **3.7**
- **3.30±0.05**
- **2.000+0.010 0.000**
- **0.48 READHEAD FLY HEIGHT**
- **2.50**
- **11.40**
- **DIRECTION "A"**
- **5.50**
- **13.00**
- **3.17 MOUNTING SURFACE**
- **3.7**

**NOTE:**

- **DIMENSIONS ARE IN MILLIMETERS.**
- **DIMENSION SPACING TOLERANCE:**
  - **13.00**
  - **5.66±0.10**
  - **3.7**
  - **3.30±0.05**
  - **2.000+0.010 0.000**
  - **0.48 READHEAD FLY HEIGHT**
  - **2.50**
  - **11.40**
  - **DIRECTION "A"**
  - **5.50**
  - **13.00**
  - **3.17 MOUNTING SURFACE**

**Celera Motion**

**MOTION DIRECTION "A"**

**ID-00403**

**MicroE**
**SCALE:**

**SIZE DWG. NO.**

**SHEET** 3 OF 6

**REV.**

**INTERFACE, OPTIRA SERIES ENCODERS, 20um ROTARY GLASS SCALES W/HUBS**

(PNR3621-HP)

---

**ID-00403**

**3rd ANGLE PROJECTION**

---

**DESCRIPTION:**

(Novanta Corporation)

125 Middlesex Tpk.

Bedford, MA 01730

---

**DIMENSIONS (IN MILLIMETERS):**

- **HUB O.D.:** 28.50 ± 0.05
- **SCALE THICKNESS:** 1.50 ± 0.03
- **HUB RELIEF:** 1.02 ± 0.10
- **SCALE PATTERN SURFACE:** 2.30 ± 0.150
- **READHEAD FLY HEIGHT:** 0.49
- **MACHINE AXIS POSITION TRACK:** (5,000 COUNTS)
- **HUB Thickness:** 2.00
- **EQ. SPACED ON A 14.10 B.C.:** 4X 2.40
- **EQ. SPACED ON A 14.10 B.C.:** 3X M2.5X0.45 - 6H
- **OPTICAL DIAMETER:** 3X 31.83

---

**TOLERANCES ARE:**

- DECIMALS: ± .25
- ANGULAR: ± 30 MIN.
- .XX ± .13

---

**UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS. DIM APPLIES AFTER PROCESSING. INTERPRET ALL GEOMETRIC TOL. PER ANSI Y14.5M-1982.**

---

**NOTE:**

- THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF Novanta Corporation AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR MANUFACTURE OR SALE OF APPARATUS WITHOUT EXPRESS WRITTEN AUTHORIZATION FROM Novanta Corporation.
DESCRIPTION:

INTERFACE, OPTIRA SERIES ENCODERS,
20um ROTARY GLASS SCALES W/HUBS
(PIGR10851-HR)

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF Novanta Corporation AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR MANUFACTURE OR SALE OF APPARATUS WITHOUT EXPRESS WRITTEN AUTHORIZATION FROM Novanta Corporation.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIIONS APPLY AFTER PROCESSING. INTERPRET ALL GEOMETRIC TOLERSACES.

TOLERANCES ARE:

PER ANSI Y14.5M-1982

DECIMALS: ANGULAR:

± .25 ± 30 MIN.

± .13

DIM APPLY AFTER PROCESSING

INTERPRET ALL GEOMETRIC TOLS.

PER ANSI Y14.5M-1982

TOLERANCES ARE:

DECIMALS: ANGULAR:

± .25 ± 30 MIN.

± .13

MACHINE AXIS

POSITION TRACK

(16,384 COUNTS)

3X 4.50 THRU ALL

Æ 8.00 Ô 4.10

EQ. SPACED ON A

Æ 37.50 B.C.

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.

SCALE PATTERN

SURFACE

2.30±0.150

2.29±0.05

SCALE THICKNESS

3.50±0.03

HUB RELIEF

3X M5x0.8 - 6H THRU ALL

EQ. SPACED ON A

Æ 37.50 B.C.
**NOTES:**

1. **CONNECTOR, HEADER, BOARD TO BOARD, 12 CONTACTS**
   - MOLEX# 501594-121 (MATING CONNECTOR MOLEX# 501591-1211).
   - REFER TO MANUFACTURING SPECIFICATION SHEET ON STACKING HEIGHTS AND REQUIREMENTS.

2. **CONNECTOR, ZIF, FFC/FPC, FLIP TOP ACTUATOR, HORIZONTAL MOUNTING, 0.5mm PITCH, 10 CONTACTS**
   - HIROSE ELECTRIC COM# FH33-10S-0.5SH(10).
   - REFER TO MANUFACTURER SPECIFICATION SHEET FOR FPC/FPC CONSTRUCTION.

### Pin Number | Signal | A-quad-B | Analog
--- | --- | --- | ---
1 | A+ | SIN+ | A+ | SIN+
2 | A- | SIN- | B+ | COS+
3 | B+ | COS+ | B- | COS-
4 | B- | COS- | INDEX+ | INDEX+
5 | INDEX+ | INDEX+ | INDEX+ | INDEX+
6 | INDEX- | INDEX- | INDEX- | INDEX-
7 | ALARM | ALARM | ALARM | ALARM
8 | CAL | CAL | CAL | CAL
9 | PWR | PWR | PWR | PWR
10 | GND | GND | GND | GND
11 | N/C | N/C | N/C | N/C
12 | N/C | N/C | N/C | N/C