# AAM 38 F
# BISS

## BLIND HOLLOW SHAFT MULTITURN ABSOLUTE ENCODER

### MAIN FEATURES

Miniaturized optical multiturn absolute encoder for high end application. Thanks to BiSS-C interface and high resolution it can be used in robotics, motor feedback and CNC machines.

- Optical sensor technology (OptoASIC + Energy Harvesting)
- 39 bit total resolution (23 bit single turn + 16 bit multiturn)
- Power supply +5 VDC with BiSS-C as electronic interface
- Cable output
- Blind hollow shaft diameter up to 8 mm
- Mounting by stator coupling
- Operating temperature -20° ... +105°C (-4° ... +221°F)

### ORDERING CODE

| AAM | 38F | 16 | / | 23 | B | 5 | B | 8 | X | X | PR | .XXX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**SERIES**
absolute multiturn encoder AAM

**MODEL**
blind hollow shaft with stator coupling 38F

**MULTITURN RESOLUTION**
bit 16

**SINGLETURN RESOLUTION**
bit 23

**CODE TYPE**
binary B

**POWER SUPPLY**
5 V DC 5

**ELECTRONIC INTERFACE**
BiSS-C B

**BORE DIAMETER**
mm 6
(1/4") mm 6,35
mm 8

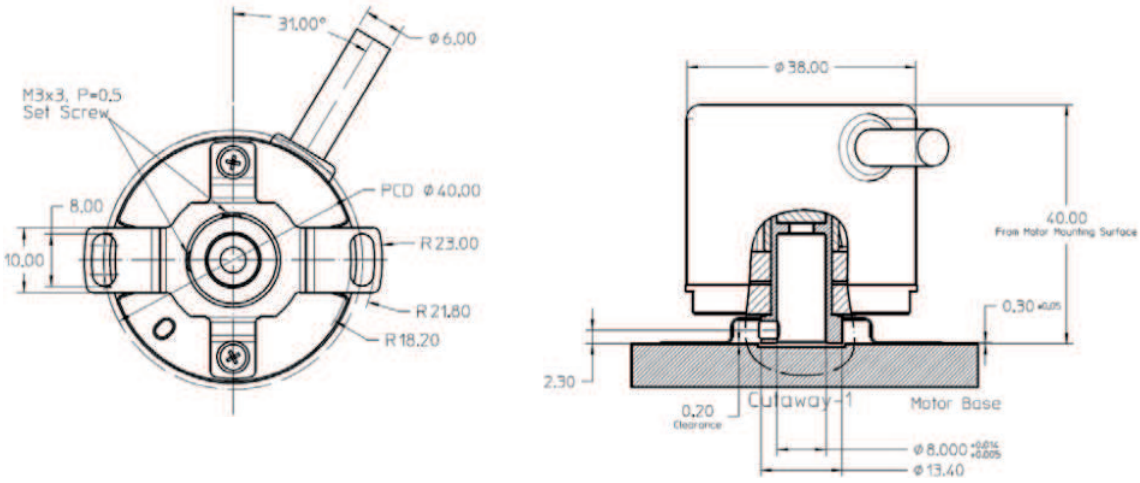
**ENCLOSURE RATING**
IP 50 X

**OPTIONS**
to be reported X

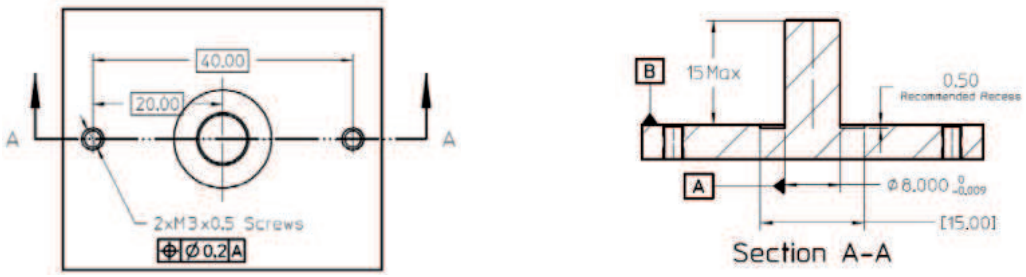
**OUTPUT TYPE**
radial cable (standard lenght 0,2m) PR

**VARIANT**
custom version XXX

## AAM 38 F




## RECOMMENDED SHAFT AND MOUNTING HOLES REQUIREMENT




*dimensions in mm*

## ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| **Multiturn resolution** | 16 bit |
| **Singleturn resolution** | 23 bit |
| **Fault status** | 8 bit |
| **CRC** | 8 bit |
| **Power supply** | 4,75 ... 5,25 V DC |
| **Current consumption without load** | < 120 mA |
| **Output type** | BiSS-C (SN65LBC179Q) |
| **Code type** | binary |
| **Clock frequency (MA)** | 80 kHz ... 10 MHz |
| **Position Calculation Time** | Refer to BiSS-C $T_{busy\ time}$ |
| **Accuracy** | ± 80 arc-sec |
| **Counting direction** | decreasing clockwise (shaft view) |
| **Start-up time** | 500 ms |
| **Electromagnetic compatibility** | IEC 61000-6-2<br>IEC 61000-6-4 |

## CONNECTIONS

| Function | Cable output |
|---|---|
| + Vdc | red |
| Ground | black |
| serial data (SLO) + | orange |
| serial data (SLO) - | blue |
| serial clock (MA)+ | brown |
| serial clock (MA) - | white |

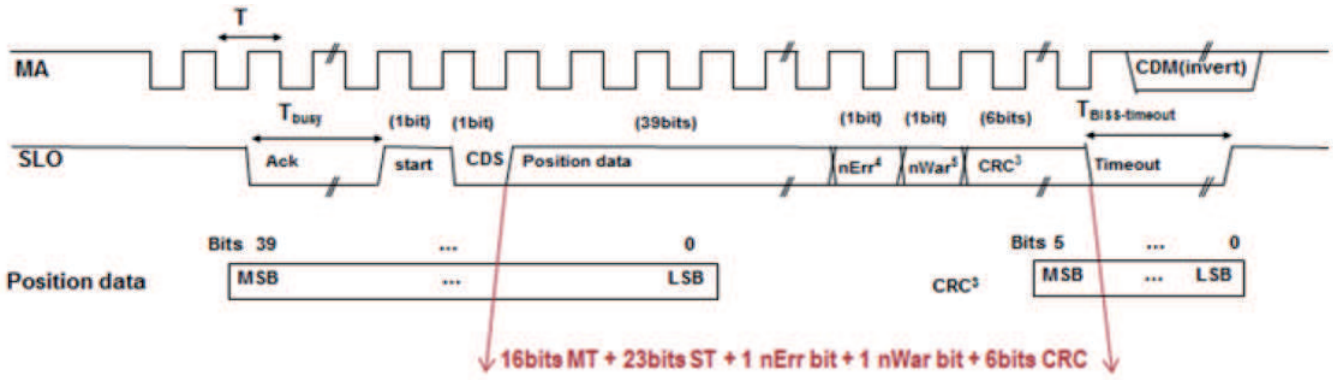
## MECHANICAL SPECIFICATIONS

| | |
|---|---|
| **Shaft diameter** | ø 6 / 6,35 (1/4") / 8 mm |
| **Enclosure rating** | IP 50 (IEC 60529) |
| **Rotation speed** | 6000 rpm continuous |
| **Shock** | 200 G, 6 ms (IEC 60068-2-27) |
| **Vibration** | 10 G, 10 ... 2000 Hz (IEC 60068-2-6) |
| **Shaft radial play allowed** | ± 0,05 mm |
| **Shaft radial play allowed** | ± 0,1 mm |
| **Shaft material** | brass |
| **Housing material** | steel |
| **Bearing stage material** | aluminum |
| **Bearings** | 2 ball bearings |
| **Bearings life** | $10^9$ revolutions |
| **Operating temperature** | -20° ... +105°C (-4° ... +221°F) |
| **Storage temperature** | -20° ... +105°C (-4° ... +221°F) |
| **Fixing torque for shaft grains** | 1 Nm recommended |
| **Fixing torque for spring screws** | 0,35 Nm recommended for M3 screws (not provided) |
| **Weight** | 150 g (5,29 oz) |

## BISS-C TIMING DIAGRAM

| Parameter | Symbol | Value | | | Unit | Note |
|---|---|---|---|---|---|---|
| | | Min | Typical | Max | | |
| MA frequency | $f_{MA}$ | 0,08 | – | 10 | MHz | 1 |
| Busy | $T_{busy}$ | 2 / $f_{MA}$ + 3,35 µs | – | 2,5 / $f_{MA}$ + 3,75 µs | µs | 2 |
| Timeout | $t_{Biss\text{-}timeout}$ | 1,5 / $f_{MA}$ | – | 1,5 / $f_{MA}$ + 90 ns | ns | 2 |

Figure 1 Timing Characteristics of MA and SLO




1. MA low-time = 0,50 / $f_{MA}$; high-time = 0,50 / $f_{MA}$
2. Refer to Figure 1 for timing description
3. CRC Polynomial = Invert of (X6 + X1 + X0)
4. nErr bit is active low. (Combine all the Error Status and reflect in nERR bit)
5. nWar bit is active low. (Combine all the Warning Status and reflect in nERR bit)

## Description

Refer to BiSS-C Interface Protocol Description Rev C5 document for detailed information of BiSS-C Register Communication.
***http://biss-interface.com/files/Bissinterface_c5es.pdf***

Figure 2 Register write access

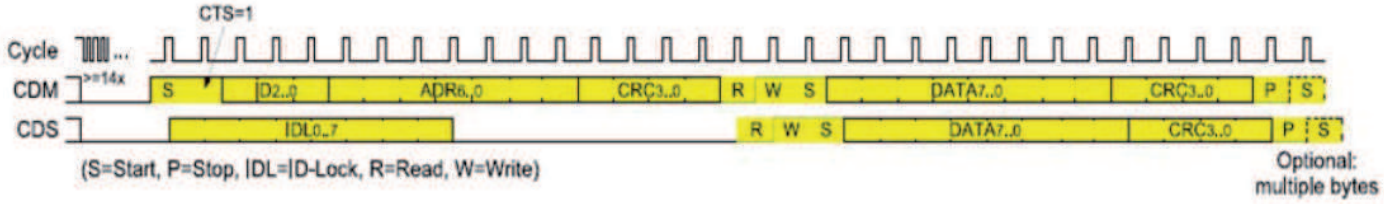



Figure 3 Register read access

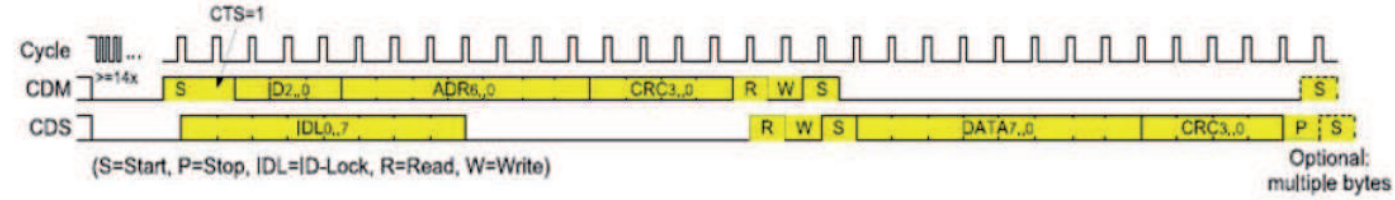



Figure 4 Writing several registers

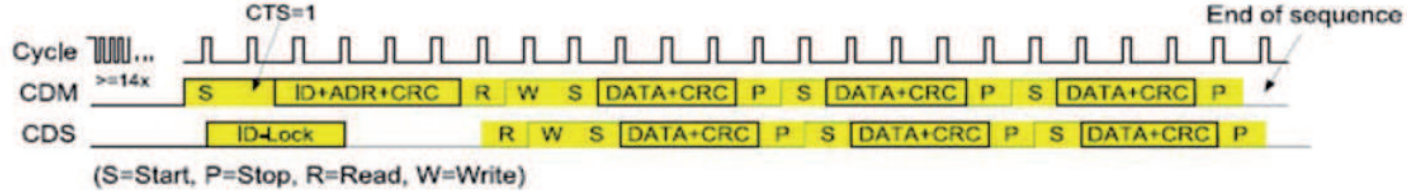
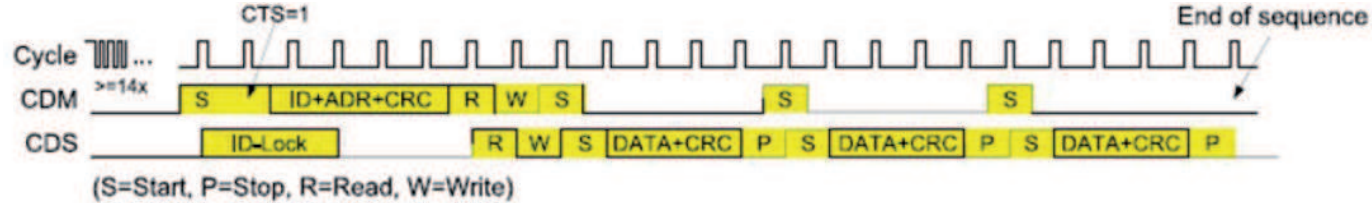



Figure 5 Reading several registers



Refer to BiSS-C Interface Protocol Description Rev C5 document for detail information of BiSS-C Register Assigment.

There are a total of 10 register banks user areas (register bank 0 to register bank 9) that are accessible by users.
The memory data is kept in nonvolatile memory.

## REGISTER ASSIGNMENTS

| Address (Decimal) | Address (Hexadecimal) | Name | Size | Memo |
|---|---|---|---|---|
| 0 ... 63 | 0x00 ... 0x3F | Register bank | 64 bytes | |
| 64 | 0x40 | Bank selection | 0 ... 8 bits (1 byte) | a, b |
| 65 | 0x41 | EDS-Bank | 0 ... 8 bits (1 byte) | a,c |
| 66 ... 67 | 0x42 ... 0x43 | Profile ID | 16 bits (2 bytes) | c, d |
| 68 ... 71 | 0x44 ... 0x47 | Serial number | 32 bits (4 byte) | c, d |
| 72 ... 119 | 0x48 ... 0x77 | Slave register | 48 bytes | |
| 120 ... 125 | 0x78 ... 0x7D | Device ID | 48 bits (6 bytes) | c, d |
| 126 ... 127 | 0x7E ... 0x7F | Manufacturer ID | 16 bits (2 bytes) | c, d |

a. If no blank switchover is used, the register should not be implemented
b. Unused register contents must therefore be filled with “0”
c. Register is protected against accidental writing
d. The value is saved as a big endian; i.e., with the highest value byte at the lowest value address

| EEPROM Address | BiSS-C | | Memo |
|---|---|---|---|
| | Page | Address | |
| 000 ... 27Fh | 0 | 00 ...3Fh | User area |
| | 1 | 00 ...3Fh | |
| | 2 | 00 ...3Fh | |
| | 3 | 00 ...3Fh | |
| | 4 | 00 ...3Fh | |
| | 5 | 00 ...3Fh | |
| | 6 | 00 ...3Fh | |
| | 7 | 00 ...3Fh | |
| | 8 | 00 ...3Fh | |
| | 9 | 00 ...3Fh | Reserved area |
| 280 ... 2FFh | 10 | 00 ...3Fh | |
| | 11 | 00 ...3Fh | |
| 300 ... 37Fh | 12 | 00 ...3Fh | |
| | 13 | 00 ...3Fh | |
| 380 ... 3BFh | 14 | 00 ...3Fh | |
| 3C0 ... 3FFh | – | 40h | Bank selection |
| | | 41h | EDS-Bank (User prohibited write) – Not Available |
| | | 42 ... 43h | Profile ID (User prohibited write) |
| | | 44 ... 47h | Serial Number (User prohibited write) |
| | | 48 ... 77h | Slave Register (Refer to the Slave Register Description – user area) |
| | | 78 ... 7Dh | Device ID (User prohibited write) |
| | | 7E ... 7F | Manufacturer ID (User prohibited write) |

## SLAVE REGISTER DESCRIPTION

**Address 72 (0x48) - Error status [7...0]**

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| NA | | | MLSErr Error | Multi-turnErr Error | STErr Error | MemoryErr Error | XCErr Error |

**Address 73 (0x49) - Warning status [7...0]**

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| NA | | | | | | Lis_Err Warning | LED_Err Warning |

**Address 74 (0x4A) - Encoder Clear Command**

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| NA | | | | Warning clear command* | Error clear command* | ST clear command* | MT clear command* |

* Encoder Clear Command operation
a. Write 1 to execute one time clear command
b. Only one command should be accessed for each time