

# NAG Library Routine Document

## F16JPF (BLAS\_DMIN\_VAL)

**Note:** before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

### 1 Purpose

F16JPF (BLAS\_DMIN\_VAL) computes the smallest component of a real vector, along with the index of that component.

### 2 Specification

```
SUBROUTINE F16JPF(N, X, INCX, K, R)
  INTEGER          N, INCX, K
  double precision X(1+(N-1)*ABS(INCX)), R
```

The routine may be called by its BLAS name ***blas\_dmin\_val***.

### 3 Description

F16JPF (BLAS\_DMIN\_VAL) computes the smallest component,  $r$ , of an  $n$ -element real vector  $x$ , and determines the smallest index,  $k$ , such that

$$r = x_k = \min_j x_j.$$

### 4 References

Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001) *Basic Linear Algebra Subprograms Technical (BLAST) Forum Standard* University of Tennessee, Knoxville, Tennessee URL: <http://www.netlib.org/blas/blast-forum/blas-report.pdf>

### 5 Parameters

- 1: N – INTEGER *Input*  
*On entry:*  $n$ , the number of elements in  $x$ .
- 2: X(1 + (N – 1) × |INCX|) – **double precision** array *Input*  
*On entry:* the vector  $x$ . Element  $x_i$  is stored in X(1 + (i – 1) × |INCX|), for  $i = 1, 2, \dots, n$ .
- 3: INCX – INTEGER *Input*  
*On entry:* the increment in the subscripts of X between successive elements of  $x$ .  
*Constraint:* INCX ≠ 0.
- 4: K – INTEGER *Output*  
*On exit:*  $k$ , the index, from the set  $\{1, 1 + |INCX|, \dots, 1 + (N - 1) \times |INCX|\}$ , of the smallest component of  $x$ . If  $N \leq 0$  on input then K is returned as 0.
- 5: R – **double precision** *Output*  
*On exit:*  $r$ , the smallest component of  $x$ . If  $N \leq 0$  on input then R is returned as 0.0.

## 6 Error Indicators and Warnings

If INCX = 0, an error message is printed and program execution is terminated.

## 7 Accuracy

Not applicable.

## 8 Further Comments

None.

## 9 Example

This example computes the smallest component and index of that component for the vector

$$x = (1, 10, 11, -2, 9)^T.$$

### 9.1 Program Text

```
*      F16JPF Example Program Text
*      Mark 22 Release. NAG Copyright 2007.
*      .. Parameters ..
      INTEGER          NIN, NOUT
      PARAMETER        (NIN=5,NOUT=6)
      INTEGER          NMAX, INCMAX
      PARAMETER        (NMAX=10,INCMAX=NMAX)
*      .. Local Scalars ..
      DOUBLE PRECISION R
      INTEGER          I, INCX, K, N
*      .. Local Arrays ..
      DOUBLE PRECISION X(1+(NMAX-1)*ABS(INCMAX))
*      .. External Subroutines ..
      EXTERNAL         BLAS_DMIN_VAL
*      .. Intrinsic Functions ..
      INTRINSIC        ABS
*      .. Executable Statements ..
      CONTINUE

      WRITE (NOUT,*) 'F16JPF/BLAS_DMIN_VAL Example Program Results'

*      Skip heading in data file
*
      READ (NIN,*)

*      Read N and INCX from data file
*
      READ (NIN,*) N, INCX

*      IF (N.LE.NMAX .AND. ABS(INCX).LE.INCMAX) THEN
*
*          Read X from data file
*
*          READ (NIN,*) (X(I),I=1,1+(N-1)*ABS(INCX),INCX)
*
*          Find K = ARGMIN(X) and R = MIN(X).
*
*          CALL BLAS_DMIN_VAL(N,X,INCX,K,R)
*
*          WRITE (NOUT,*)
*          WRITE (NOUT,99999) K
*          WRITE (NOUT,99998) R
      END IF

*
99999 FORMAT (1X,'Index of smallest component of X is',I3)
99998 FORMAT (1X,'Smallest component of X is',F12.5)
      END
```

## F16JPF/BLAS\_DMIN\_VAL Example Program Data

```
: N and INCX
: Array X
```

## F16JPF/BLAS\_DMIN\_VAL Example Program Results

```
Index of smallest component of X is 4
Smallest component of X is -2.00000
```