

String Handling UDFBs
MID, LEFT, RIGHT, Concat, Find_Char
User-Defined Function Blocks (UDFBs)

Description:

In Cscape Standard IEC languages – strings are handled as short integer (USINT) arrays, terminated with an ASCII NULL (decimal 0). Native string functions include String Compares and String Length.

The String Handling UDFBs have been created to allow users to perform common string functions that are NOT included in the native function blocks. For the most part, these UDFBs are based on IEC-61131 functions included in the Enhanced IEC editor in Cscape. All these UDFBs can support strings as large as 256 characters.

All the UDFBs in this group execute when the EN input transitions from OFF to ON – and fully execute on a single logic scan. The UDFBs will not re-execute until the next OFF to ON transition of the EN input.

MID UDFB

Description. This UDFB creates a new string (Out_Ay) that is extracted from a source string (In_Ay). It extracts a (Len) number of characters, starting with the (Posn) character. Posn is 1-based. If Posn is less than or equal to 0, it is automatically set to 1. An ERR is reported if the Len input is greater than 256 characters.

The input parameters for this UDFB are listed and described in the table below:

Input	Descriptive Name	Data Type
EN	Enable Execution (edge sensitive)	BOOL
In_Ay	Source Input String	USINT Array (max DIM 256)
Len	Number of characters to extract from the source string	DINT
Posn	Starting character position in the source string to extract from	DINT

EN - BOOL

This is the Enable input. It must transition from OFF to ON for the UDFB to execute. When it is not energized, all outputs of the UDFB are set to 0.

In_Ay (USINT DIM[0..255] max)

This is the source string – which is a short integer (USINT) array terminated with the NULL character (decimal 0). The UDFB uses the IN_Ay as its source – but does not modify the array.

Len – DINT *lengths from 1 to 256 are supported*

This variable determines how many characters will be extracted from the source string. If Len is set to an illegal value (greater than 256), then the **ERR** output will be asserted.

Posn – DINT

This variable determines at which character position in the source string the extracted string shall be taken. This variable is 1-based. If Posn is less than or equal to 0, it is automatically set to 1.

The output parameters for this UDFB are listed and described in the table below:

Output	Descriptive Name	Data Type
Out_Ay	Output String (NULL terminated)	USINT Array (max DIM 256)
ERR	Error Bit	BOOL

Out_Ay (USINT [DIM 0..255] max)

This is the output string – which is a USINT array terminated with the NULL character (decimal 0). While the UDFB is not enabled, this variable will contain a NULL string (all Decimal 0's)

ERR (BOOL)

If the Len input parameter to the UDFB is set to an illegal value (greater than 256), the ERR bit will turn ON, and the UDFB will not execute further. While the UDFB is not enabled, the ERR bit will be held OFF.

LEFT UDFB

Description. This UDFB creates a new string (Out_Ay) that is extracted from a source string (In_Ay). It extracts a (Len) number of characters, starting with the left-most (first) character. If Len is greater than the entire length of the source string (In_Ay), the entire string is returned. An ERR is reported if the Len input is greater than 256 characters.

The input parameters for this UDFB are listed and described in the table below:

Input	Descriptive Name	Data Type
EN	Enable Execution (edge sensitive)	BOOL
In_Ay	Source Input String	USINT Array (max DIM 256)
Len	Number of characters to extract from the source string	DINT

EN - BOOL

This is the Enable input. It must transition from OFF to ON for the UDFB to execute. When it is not energized, all outputs of the UDFB are set to 0.

In_Ay (USINT DIM[0..255] max)

This is the source string – which is a USINT array terminated with the NULL character (decimal 0). The UDFB uses the In_Ay as its source – but does not modify the array itself.

Len – DINT lengths from 1 to 256 are supported

This variable determines how many characters will be extracted from the source string. If Len is greater than the entire length of the source string (In_Ay), the entire string is returned. If Len is set to an illegal value (greater than 256), then the **ERR** output will be asserted.

The output parameters for this UDFB are listed and described in the table below:

Output	Descriptive Name	Data Type
Out_Ay	Output String (NULL terminated)	USINT Array (max DIM 256)
ERR	Error Bit	BOOL

Out_Ay (USINT [DIM 0..255] max)

This is the output string – which is a USINT array terminated with the NULL character (decimal 0). While the UDFB is not enabled, this variable will contain a NULL string (all Decimal 0's)

ERR (BOOL)

If the Len input parameter to the UDFB is set to an illegal value (greater than 256), the ERR bit will turn ON, and the UDFB will not execute further. While the UDFB is not enabled, the ERR bit will be held OFF.

RIGHT UDFB

Description. This UDFB creates a new string (Out_Ay) that is extracted from a source string (In_Ay). It extracts a (Len) number of characters. The characters extracted are the right-most characters. If Len is greater than the entire length of the source string (In_Ay), the entire string is returned. An ERR is reported if the Len input is greater than 256 characters.

The input parameters for this UDFB are listed and described in the table below:

Input	Descriptive Name	Data Type
EN	Enable Execution (edge sensitive)	BOOL
In_Ay	Source Input String	USINT Array (max DIM 256)
Len	Number of characters to extract from the source string	DINT

EN - BOOL

This is the Enable input. It must transition from OFF to ON for the UDFB to execute. When it is not energized, all outputs of the UDFB are set to 0.

In_Ay (USINT DIM[0..255] max)

This is the source string – which is a USINT array terminated with the NULL character (decimal 0). The UDFB uses the In_Ay as its source – but does not modify the array itself.

Len – DINT lengths from 1 to 256 are supported

This variable determines how many characters will be extracted from the source string. If Len is greater than the entire length of the source string (In_Ay), the entire string is returned. If Len is set to an illegal value (greater than 256), then the **ERR** output will be asserted.

The output parameters for this UDFB are listed and described in the table below:

Output	Descriptive Name	Data Type
Out_Ay	Output String (NULL terminated)	USINT Array (max DIM 256)
ERR	Error Bit	BOOL

Out_Ay (USINT [DIM 0..255] max)

This is the output string – which is a USINT array terminated with the NULL character (decimal 0). While the UDFB is not enabled, this variable will contain a NULL string (all Decimal 0's).

ERR (BOOL)

If the Len input parameter to the UDFB is set to an illegal value (greater than 256), the ERR bit will turn ON, and the UDFB will not execute further. While the UDFB is not enabled, the ERR bit will be held OFF.

Concat UDFB

Description. This UDFB creates a new string (Out_Ay) which is the combination of two source strings (In1_Ay & In2_Ay). It also reports the total length (Out_Len) of the new string. An ERR is reported if either of the source strings (In1_Ay & In2_Ay) or the new string (Out_Ay) exceed 256 characters.

The input parameters for this UDFB are listed and described in the table below:

Input	Descriptive Name	Data Type
EN	Enable Execution (edge sensitive)	BOOL
In1_Ay	First Source Input String	USINT Array (max DIM 256)
In2_Ay	Second Source Input String	USINT Array (max DIM 256)

EN - BOOL

This is the Enable input. It must transition from OFF to ON for the UDFB to execute. When it is not energized, all outputs of the UDFB are set to 0.

In1_Ay (USINT DIM[0..255] max)

This is the first source string – which is a USINT array terminated with the NULL character (decimal 0). The UDFB uses the In1_Ay as a source – but does not modify the array itself.

In2_Ay (USINT DIM[0..255] max)

This is the second source string – which is a USINT array terminated with the NULL character (decimal 0). The UDFB uses the In1_Ay as a source – but does not modify the array itself.

The output parameters for this UDFB are listed and described in the table below:

Output	Descriptive Name	Data Type
Out_Ay	Output String (NULL terminated)	USINT Array (max DIM 256)
Out_Len	Length of the Output String	DINT
ERR	Error Bit	BOOL

Out_Ay (USINT [DIM 0..255] max)

This is the output string – which is a USINT array terminated with the NULL character (decimal 0). The output string is the concatenation of the two input strings back to back. While the UDFB is not enabled, this variable will contain a NULL string (all Decimal 0's)

Out_Len (DINT)

This is the length of the concatenated output string expressed as a double integer (DINT). While the UDFB is not enabled, this variable will contain a NULL string (all Decimal 0's).

ERR (BOOL)

If the length of either of the input strings or the sum of their lengths is greater than 256 characters, the ERR output turns ON. While the UDFB is not enabled, the ERR bit will be held OFF.

Find_Char UDFB

Description. This UDFB searches a source string (In_Ay) for a specific character (Char). The search can be limited to a fixed number of positions (Last_Posn) in the string. The UDFB returns the 1-based location (Char_Posn) of the first instance of the target character (Char). If the target character is not found, a value of -1 is reported as the result (Char_Posn). An ERR is reported if the Last_Posn input variable is less than 1 or greater than 256.

The input parameters for this UDFB are listed and described in the table below:

Input	Descriptive Name	Data Type
EN	Enable Execution (edge sensitive)	BOOL
In_Ay	Source Input String	USINT Array (max DIM 256)
Last_Posn	Final (1-based) position to search for the target character	DINT
Char	Target Character	USINT

EN - BOOL

This is the Enable input. It must transition from OFF to ON for the UDFB to execute. When it is not energized, all outputs of the UDFB are set to 0.

In_Ay (USINT DIM[0..255] max)

This is the source string – which is a USINT array terminated with the NULL character (decimal 0). The UDFB uses the In_Ay as its source – but does not modify the array itself.

Last_Posn – DINT *lengths from 1 to 256 are supported*

This variable determines the final source character position (1-based) in which the UDFB will search for the target character. If the Len is less than 1 or greater than 256, then the **ERR** output will be asserted.

Char – USINT

This variable is the target character to be searched for in the source string.

The output parameters for this UDFB are listed and described in the table below:

Output	Descriptive Name	Data Type
Out_Ay	Output String (NULL terminated)	USINT Array (max DIM 256)
ERR	Error Bit	BOOL

Char_Posn (DINT)

This is the the 1-based location of the first instance of the target character. If the target character is not found between the first position of the source string and the specified last position to search – the Char_Posn variable will return -1.

ERR (BOOL)

If the Last_Posn input parameter to the UDFB is set to a value less than 1 or greater than 256, the ERR bit will turn ON, and the UDFB will not execute further. While the UDFB is not enabled, the ERR bit will be held OFF.