

# S15C Analog Converter (Voltage and Current) - IO-Link Data Reference Guide



## IO-Link Data Map

This document refers to the following IODD file: Banner\_Engineering-S15C-IU-20200715-IODD1.1.xml. The IODD file and support files can be found on [www.bannerengineering.com](http://www.bannerengineering.com) under the download section of the product family page.

## Communication Parameters

The following communication parameters are used.

| Parameter               | Value     | Parameter              | Value |
|-------------------------|-----------|------------------------|-------|
| IO-Link revision        | V1.1      | Port class             | A     |
| Process Data In length  | 32 bits   | SIO mode               | Yes   |
| Process Data Out length | N/A       | Smart Sensor Profile   | Yes   |
| Bit Rate                | 38400 bps | Block parameterization | Yes   |
| Minimum cycle time      | 3.6 ms    | Data Storage           | Yes   |

## IO-Link Process Data In (Device to Master)

Process Data In is transmitted cyclically to the IO-Link master from the IO-Link device.

Two analog files are supported by the IODD file. The voltage model is presented in mV and the current mode is presented in  $\mu\text{A}$ .

If the model is the voltage version, then Process Data Input = value  $\times$  0.001 V.

If the model is the current version, then Process Data Input = value  $\times$  0.000001 A.

## Process Data Input Configuration - Analog Data

| Subindex | Name              | Number of Bits | Data Values                  |
|----------|-------------------|----------------|------------------------------|
| 1        | Measurement Value | 32             | The measurement device value |

## Example Process Data Input Configuration - Analog Data (Voltage Model)

| Octet 0    |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|
| Subindex   | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Bit offset | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 |
| Value      | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

| Octet 1    |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|
| Subindex   | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Bit offset | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| Value      | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

| Octet 2    |    |    |    |    |    |    |   |   |
|------------|----|----|----|----|----|----|---|---|
| Subindex   | 1  | 1  | 1  | 1  | 1  | 1  | 1 | 1 |
| Bit offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| Value      | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 1 |

| Octet 3    |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|
| Subindex   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Bit offset | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Value      | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |



### Example Based Upon the Value Above

Measurement Value = 509

Scaled Measurement Value = 0.509 V

### Process Data Input Configuration - Digital Measuring Sensor

| Subindex | Name              | Number of Bits | Data Values                                                  |
|----------|-------------------|----------------|--------------------------------------------------------------|
| 1        | Measurement Value | 16             | The measurement device value                                 |
| 2        | Measurement Scale | 8              | The measurement device scale<br>Voltage = -3<br>Current = -6 |

### Example Process Data Input Configuration - Digital Measuring Sensor (Voltage Model)

|                |     |     |     |     |     |     |     |     |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>Octet 0</b> |     |     |     |     |     |     |     |     |
| Subindex       | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   |
| Bit offset     | 31  | 30  | 29  | 28  | 27  | 26  | 25  | 24  |
| Value          | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1   |
| <b>Octet 1</b> |     |     |     |     |     |     |     |     |
| Subindex       | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1   |
| Bit offset     | 23  | 22  | 21  | 20  | 19  | 18  | 17  | 16  |
| Value          | 1   | 1   | 1   | 1   | 1   | 1   | 0   | 1   |
| <b>Octet 2</b> |     |     |     |     |     |     |     |     |
| Subindex       | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 2   |
| Bit offset     | 15  | 14  | 13  | 12  | 11  | 10  | 9   | 8   |
| Value          | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 1   |
| <b>Octet 3</b> |     |     |     |     |     |     |     |     |
| Subindex       | /// | /// | /// | /// | /// | /// | /// | /// |
| Bit offset     | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| Value          |     |     |     |     |     |     |     |     |

### Example Based Upon the Value Above

Measurement Value = 509

Measurement Scale = -3

Scaled Measurement Value = 0.509 V

### Parameters Set Using IO-Link

These parameters can be read from and/or written to an S15C-I-KQ or S15C-U-KQ converter. Also included is information about whether the variable in question is saved during Data Storage and whether the variable came from the IO-Link Smart Sensor Profile. Unlike Process Data In, which is transmitted from the IO-Link device to the IO-Link master cyclically, these parameters are read or written acyclically as needed.

| Index | Sub-index | Name                                                                 | Length | Value Range                                                                     | Default | Access Rights | Data Storage? | Smart Sensor Profile |
|-------|-----------|----------------------------------------------------------------------|--------|---------------------------------------------------------------------------------|---------|---------------|---------------|----------------------|
| 0     | 1-16      | Direct Parameter Page 1 (incl. Vendor ID & Device ID)                |        |                                                                                 | ro      |               |               |                      |
| 1     | 1-16      | Direct Parameters Page 2                                             |        |                                                                                 |         | rw            |               |                      |
| 2     |           | Standard Command                                                     |        | 130 = Restore Factory Settings<br>162 = Start discovery<br>163 = Stop discovery |         | wo            |               | y                    |
| 3     |           | Data Storage Index (device-specific list of parameters to be stored) |        |                                                                                 |         | rw            |               |                      |

| Index     | Sub-index | Name                                     | Length              | Value Range                                                                                                                        | Default            | Access Rights | Data Storage? | Smart Sensor Profile |
|-----------|-----------|------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|---------------|----------------------|
| 4-11      |           | <i>reserved by IO-Link Specification</i> |                     |                                                                                                                                    |                    |               |               |                      |
| <b>12</b> |           | <b>Device Access Locks</b>               |                     |                                                                                                                                    |                    |               |               |                      |
| 12        | 1         | Parameter Write Access Lock              |                     | 0 = off, 1 = on                                                                                                                    | 0                  | rw            | y             |                      |
| 12        | 2         | Data Storage Lock                        |                     | 0 = off, 1 = on                                                                                                                    | 0                  | rw            | y             |                      |
| 12        | 3         | Local Parameterization Lock              |                     | 0 = off, 1 = on                                                                                                                    | 0                  | rw            | y             |                      |
| 12        | 4         | Local User Interface Lock                |                     | 0 = off, 1 = on                                                                                                                    | 0                  | rw            | y             |                      |
| 13        |           | Profile Characteristic                   |                     |                                                                                                                                    |                    | ro            |               |                      |
| 14        |           | PDInput Descriptor                       |                     |                                                                                                                                    |                    | ro            |               |                      |
| 15        |           | PDOOutput Descriptor                     |                     |                                                                                                                                    |                    | ro            |               |                      |
| 16        |           | Vendor Name string                       |                     | Banner Engineering Corporation                                                                                                     |                    | ro            |               |                      |
| 17        |           | Vendor Text string                       |                     | More Sensors. More Solutions.                                                                                                      |                    | ro            |               |                      |
| 18        |           | Product Name string                      |                     |                                                                                                                                    |                    | ro            |               |                      |
| 19        |           | Product ID string                        |                     |                                                                                                                                    |                    | ro            |               |                      |
| 20        |           | Product Text string                      |                     |                                                                                                                                    |                    | ro            |               | y                    |
| 21        |           | Serial Number                            |                     |                                                                                                                                    |                    | ro            |               |                      |
| 22        |           | Hardware Versopm                         |                     |                                                                                                                                    |                    | ro            |               |                      |
| 23        |           | Firmware Version                         |                     |                                                                                                                                    |                    | ro            |               | y                    |
| 24        |           | App Specific Tag (user defined)          |                     |                                                                                                                                    |                    | rw            | y             | y                    |
| 25        |           | Function Tag                             |                     |                                                                                                                                    |                    | rw            | y             | y                    |
| 26        |           | Location Tag                             |                     |                                                                                                                                    |                    | rw            | y             | y                    |
| 27-35     |           | <i>reserved</i>                          |                     |                                                                                                                                    |                    |               |               |                      |
| 36        |           | Device Status                            | 8-bit integer       | 0 = Device is OK<br>1 = Maintenance required<br>2 = Out of specification<br>3 = Functional check<br>4 = Failure<br>5..255 Reserved |                    | ro            |               |                      |
| 37        |           | Detailed Device Status                   | Array[6] of 3-octet |                                                                                                                                    |                    | ro            |               |                      |
| 38-39     |           | <i>reserved</i>                          |                     |                                                                                                                                    |                    |               |               |                      |
| 40        |           | Process Data Input                       |                     | <i>see Process Data In</i>                                                                                                         |                    | ro            |               |                      |
| 41-57     |           | <i>unused/reserved</i>                   |                     |                                                                                                                                    |                    |               |               |                      |
| <b>60</b> |           | <b>BDC1 Setpoints</b>                    |                     |                                                                                                                                    |                    |               |               |                      |
| 60        | 1         | Setpoint SP1                             | 32-bit Integer      |                                                                                                                                    | 0.004 A<br>0.2 V   | rw            |               |                      |
| 60        | 2         | Setpoint SP2                             | 32-bit Integer      |                                                                                                                                    | 0.02 A<br>10 V     | rw            |               |                      |
| <b>61</b> |           | <b>BDC1 Configuration</b>                |                     |                                                                                                                                    |                    |               |               |                      |
| 61        | 1         | <i>reserved</i>                          | 8-bit Uinteger      |                                                                                                                                    |                    |               |               |                      |
| 61        | 2         | <i>reserved</i>                          |                     |                                                                                                                                    |                    |               |               |                      |
| 61        | 3         | Hysteresis                               | 16-bit Uinteger     |                                                                                                                                    | 0.0001 A<br>0.05 V | rw            |               |                      |
| <b>69</b> |           | <b>All-Time Run Time</b>                 |                     |                                                                                                                                    |                    |               |               |                      |
| 69        | 1         | Run counter                              | 32-bit Uinteger     | 0..2147483647                                                                                                                      |                    | ro            | y             |                      |
| <b>70</b> |           | <b>Resettable Run Time</b>               |                     |                                                                                                                                    |                    |               |               |                      |
| 70        | 1         | Run counter                              | 32-bit Uinteger     | 0..2147483647                                                                                                                      | 0                  | rw            |               |                      |
| <b>76</b> |           | <b>Vendor Specific Configuration</b>     |                     |                                                                                                                                    |                    |               |               |                      |
| 76        | 1         | Process Data Input Configuration         | 8-bit Uinteger      | 0 = Analog Value<br>1 = Digital Measurement Value                                                                                  | 0                  | rw            |               |                      |
| 76        | 2         | IOL Filter Time                          | 16-bit Uinteger     |                                                                                                                                    | 200                | rw            |               |                      |

| Index        | Sub-index | Name                                  | Length          | Value Range                                                                 | Default | Access Rights | Data Storage? | Smart Sensor Profile |
|--------------|-----------|---------------------------------------|-----------------|-----------------------------------------------------------------------------|---------|---------------|---------------|----------------------|
| <b>78</b>    |           | <b>All-Time Run Time Event Time</b>   |                 |                                                                             |         |               |               |                      |
| 78           | 1         | Event Time                            | 32-bit Uinteger | 0..2147483647                                                               | 0       | rw            | y             |                      |
| <b>79</b>    |           | <b>Resettable Run Time Event Time</b> |                 |                                                                             |         |               |               |                      |
| 79           | 1         | Event Time                            | 32-bit Uinteger | 0..2147483647                                                               | 0       | rw            | y             |                      |
| 86           |           | Model Type                            | 8-bit Uinteger  | 0 = Voltage, 1 = Current                                                    | 0       | ro            |               |                      |
| <b>16512</b> |           | <b>MDC Descriptor</b>                 |                 | <b>Measuring Data Channel Descriptor - Smart Sensor Profile 2nd Edition</b> |         |               |               | y                    |
| 16512        | 1         | Lower Limit                           | 32-bit integer  |                                                                             |         | ro            |               | y                    |
| 16512        | 2         | Upper Limit                           | 32-bit integer  |                                                                             |         | ro            |               | y                    |
| 16512        | 3         | Unit                                  | 16-bit uinteger | 1209 = A, 1240 = V                                                          |         | ro            |               | y                    |
| 16512        | 4         | Scale                                 | 8-bit integer   | -6 (µA), -3(mV)                                                             |         | ro            |               | y                    |

## IO-Link Events

Events are acyclic transmissions from the IO-Link device to the IO-Link master. Events can be error messages and/or warning or maintenance data.

| Code           | Type    | Name                      | Description                                                             |
|----------------|---------|---------------------------|-------------------------------------------------------------------------|
| 25376 (0x6320) | Error   | Parameter error           | Check data sheet and values                                             |
| 36000 (0x8CA0) | Warning | All-time Run Time Event   | Event indicating the corresponding configured running time has elapsed. |
| 36001 (0x8CA1) | Warning | Resettable Run Time Event | Event indicating the corresponding configured running time has elapsed. |

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Banner Engineering:](#)

[S15C-U-KQ](#) [S15C-I-KQ](#)