Function description freely programmable SIRIUS ACT ID Key module

ID Key electronic module / 3SU1400-1GE10-1AA0 / function description

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Table of contents

1. Product description and delimitation

With the freely programmable ID key switch module, customers have access to another IO-Link variant in addition to the standard module. In contrast to the standard IO-Link module, which contains the logic for switching four different authorization levels in the module, this logic does not exist in the freely programmable version.
The freely programmable IO-Link module is only used to transmit angular momentum on the actuator, to transmit information as to whether an ID key is inserted and its unique ID. Furthermore, the individual four LEDs (red, green, yellow) on the actuator can be individually controlled and animated.
The freely programmable IO-Link module can thus cover a wide range of applications. The user must program them with the help of TIA Portal STEP7 program blocks.
This functional description is aimed at programmers of the freely programmable IO-Link module. The information contained therein is intended to provide assistance with programming work.
If there is also a need for programming support, an FAQ is available in SIOS, which contains individual, already elaborated sample program blocks.

2. Basic function

The module is part of the SIRIUS ACT monitoring and signaling device spectrum. The ID key switch is a future-oriented portfolio element and can be used with the freely programmable IO-Link module. A plastic holder is required for assembly. The module can be mounted both in a special housing with a command post and inside a control cabinet (front panel mounting). The module works exclusively with IO-Link. An IO-Link master is therefore essential.
The basic function of the IO-Link module, which can be freely programmed, is the transmission of angular momentum on the actuator (left, right).

2.1 Technical information

Power supply: 24V DC, maximum current 200mA, connected to L+ and L-.

RFID: Frequency 125 kHz. Use only with 3SU1 RFID keys. Reading distance limited to a few mm (key must be inserted into the ID actuator).

Device LEDs: On the back of the device, there are two device LEDs (green and red) that signal the correct operation of the device and two IO-Link LEDs (green and red) that signal the IO-Link function.

3. ID key switch function

3.1 General description of the ID key switch

The purpose of the ID key is to replace mechanical locks of various machines. It uses keys that work according to the RFID principle. The fact that each RFID key has its own RFID number ensures that no unwanted access permissions are granted.
With the freely programmable IO-Link module, the following information is transmitted between the module and the controller with the help of IO-Link:

- Pulse Rotate Right
- Pulse Rotate Left
- ID of the inserted key
- Information key stuck

This information can be used to implement customer specific S7 programs within TIA Portal STEP 7. The use of the module therefore requires the user to have programming knowledge within TIA Portal STEP 7.
In addition, the four LEDs on the actuator of the ID key switch can be individually controlled and thus also animated.

3.2 RFID key

Design of the 5 different RFID keys

Function of RFID keys
Inside the key is a passive RFID tag. Each key has a unique number. This number is 40 bits long. It is fixed and cannot be changed by the customer. The RFID key periodically sends its ID number into the device. The colors of the individual keys have no function in connection with the freely programmable IO-Link module.
Based on the coding, the color of the key can be inferred.

Group 1 = Green Key
Group 2 = Yellow key
Group 3 = Red Key
Group 4 = Blue Key

Individual = White Key

ID Key	Group
….00000	1
….00001	1
….00010	1
….00011	1
….00100	1
….00101	2
….00110	2
….00111	2
….01000	2
….01001	2
….01010	3
….01011	3
….01100	3
….01101	3
….01110	3
….01111	4
….10000	4
….10001	4
….10010	4
….10011	4
….10100	Individual
….10101	Individual
….10110	Individual
….10111	Individual
….11000	Individual
….11001	Individual
….11010	Individual
….11011	Individual
….11100	Individual
….11101	Individual
….11110	Individual
….11111	Individual

Rotary knob function
The signals do not come via the outputs of the module, but via the process image. The signals on the module are deactivated in this variant.

Illustration of the rotary knob

Figure 1: Rotary knob – plastic variant

Figure 2: Rotary knob – metal variant

Rotary knob function (Digital outputs DQ.0 and DQ.1)
The module detects the rotation of the knob and sends this information as a pulse to the digital output 0 or the digital output 1.
Clockwise rotation generates a pulse at the DQ.0 output and counterclockwise rotation at the DQ.1 output over the process image. The pulse width is 25 ms.
It is possible to rotate the knob 360° clockwise and counterclockwise in 45° increments.

RFID Key Detection (Digital output DQ.4)
If a valid RFID key is detected, DQ.4 is switched. Otherwise, DQ.4 will not be switched.
Note: Information about the digital output state is transmitted via IO-Link in the process data channel - see Chapter 4.

3.3 Functions of the LEDs

LEDs can be activated individually or by pre-prepared animations. Individually: Each LED can be activated/deactivated by process data output (more in part 5.2)

Animations:

1:

2:

3:

4:

5:

6:

Rear IO-Link LEDs

The IO-Link LED is used to signal the communication status. When the device is in IDLE mode or SIO mode, the LEDs are off.

If the IO-Link communication is running correctly, the green IO-Link LED flashes according to the IO-Link V1.1 specification: period approx. 1 second, the LED is switched on for approx. 0.9 seconds. In this case, the red IO-Link LED is switched off.

If IO-Link communication fails, the green IO-Link LED is turned off and the red IO-Link LED is turned on.

Function	IO-Link LED Color
IO-Link communication runs	Light:  0,9s /  0,1s
IDLE / SIO mode	Light: 
IO-Link communication error	Light: 

Rear Devices LEDs
The device LED is used to signal the correct functioning of the device. Consequently, to detect serious breakdowns of the device. If there is an overload or short circuit of the outputs or an internal fault, it will be signaled by this LED.
If one of these fatal errors has occurred, the green device LED is off and the red device LED is on. If none of these fatal errors occur, the green device LED is lit and the red device LED is off.

Function	Devices LED Color
Normal	
Overload, internal error	

3.4 Device settings

Parameterization is carried out via index 131.

Index 131			
Subindex	**Byte. Bit**	**Parameter**	**Description**
1, 2, 3	0.0 -15.7	reserved	
4	16.0	Animation delay	Delay between each individual animation phase (1 - 1000 ms); Animation speed

1.1 3.5 Device diagnostics

Diagnostics are possible via the process data channel and ISDU channel (index 92, index 94 (key inserted)).
For a description of the process data, see chapter 4.

Index 92		
subindex	**Byte.bit**	**Parameter**
1, 2, 3	0.0 – 15.7	reserved
4	16.0	Ready
5	16.1	Group error
6, 7, 8, 9, 10, 11	16.2 – 16.7	reserved
12	17.0	Digital output 0
13	17.1	Digital output 1
14	17.2	reserved
15	17.3	reserved
16	17.4	Digital output 4
17, 18, 19	17.5 – 17.7	reserved
20	18.0	Identification of ID key (key recognized)

Index 94		
subindex	**Byte.bit**	**Parameter**
1, 2, 3	0.0 – 15.7	reserved
4	16.0 – 20.7	Identification number of detected ID key (5 bytes) *

Animation delay	500 ms

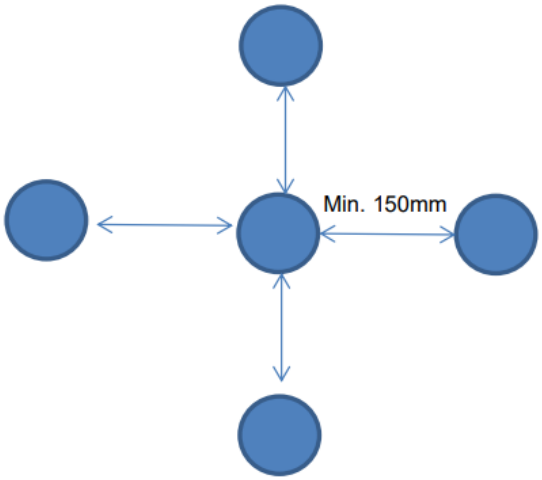
Restore Factory Setting – system command	
Index: 2, subindex: 0	
130 [0x82]hex	Restore Factory Setting

1.2 3.6 Outputs

The module has 3 semiconductor outputs.
Maximum current: 250mA /each output 750mA/module
If the total output current is less than 200 mA, the module can be powered by the IO-LinkMaster (terminals L+, L- and C/Q).
If the total output current is higher than 200 mA, the module must be connected to an external power supply 24V DC (terminals 1M and 1L+).
The load must be placed between DQ. X and L- or 1M.

4. **Assembly**

See instruction manual.
ID key modules are devices that generate a radio field. This field is small but can affect other ID key modules.
The minimum distances between the modules are 150 mm.



5. Process

1.3 5.1 Process Data Input

There are 2 bytes of process data input (data from the device to the IO-Link master):

Process Data Input		
Bit	**Byte 0**	**Byte 1**
0	Ready	ID Key recognized
1	Group error	Digital output 0 DQ.0
2	Reserved	Digital output 1 DQ.1
3	Reserved	reserved
4	Reserved	reserved
5	Reserved	Digital output 4 DQ.4
6	Reserved	Reserved
7	Reserved	Reserved

1.4 5.2 Process Data Output

There are 2 bytes of process data output (data from the IO-Link master to the device):

Process Data Output		
Bit	**Byte 0**	**Byte 1**
0	LED 1 Control (Green)	Animation color - Green
1	LED 1 Control (Red)	Animation color – Red
2	LED 2 Control (Green)	LED animation 1
3	LED 2 Control (Red)	LED animation 2
4	LED 3 Control (Green)	LED animation 3
5	LED 3 Control (Red)	LED animation 4
6	LED 4 Control (Green)	LED animation 5
7	LED 4 Control (Red)	LED animation 6

Byte 0 - Direct control of the switch LEDs 1 - 4 in any combination.
Byte 1 - Execution of a preset animation (bits 2 - 7, only one bit can be selected) in selected color (bits 0, 1)
If any LED animation preset is selected, direct control of LEDs via process data output byte 0 is not possible.