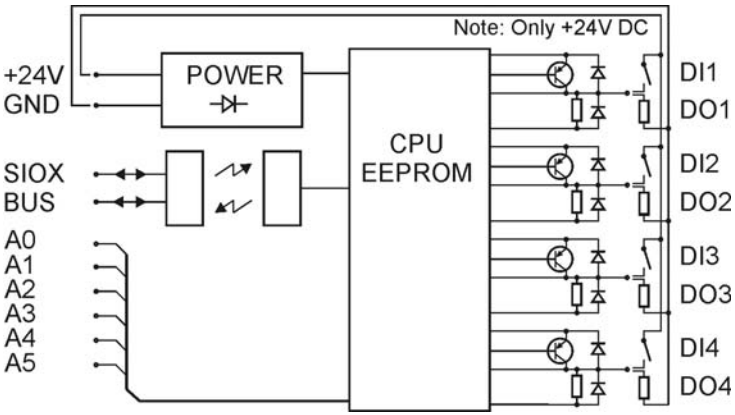
TELEFRANG AB

SIOX Four I/O Mini Module SD1

General Description.

SD1 is a general purpose four digital I/O module, isolated from the communication bus.
Watchdog, input functions and count modes are saved in an EEPROM. The module is installed in a junction box, to simplify installation. SD1, together with other SIOX I/O modules, can communicate using a common wire pair to reduce cabling.

Block Diagram:



Versions:

SD1	SIOX 4 I/O Mini Module
R00	SIOX Mini Box
S00	SIOX Box (Square)
T00-1	With Mains Supply

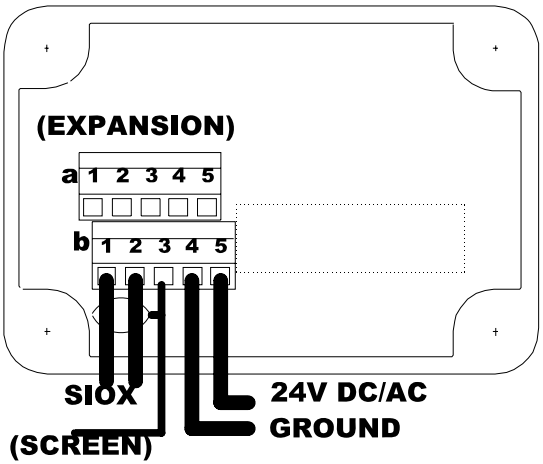
TABLE OF CONTENTS

Installation and Startup.

The SD1 is installed in an R00, S00 or T00-1 junction box, which can be prewired and permanently installed by an electrician. At commissioning, the test engineer sets the address jumpers in the box and plugs in the SD1 module. The junction box is splash-proof (IP65) and may be used without any external casing in heavily distributed installations.

The SIOX modules should be interconnected through a two-wire, low capacitance twisted pair. Shielded cables may be used but unless a correct strategy for shield grounding is adopted, it may prove to be of little benefit. Instead, the capacitance between the shield and the bus wires will add to the total capacitive load on the SIOX bus and decrease the maximum distance over which communication can be carried out for a given bit rate. The total resistance of the bus should not be higher than 2 * 50Ω.

To power the module, two more wires are connected to a local or centralized 24V supply. When local supplies are used, the optoisolated communication connection of most SIOX modules permit systems without hazardous voltages or noisy ground loops.

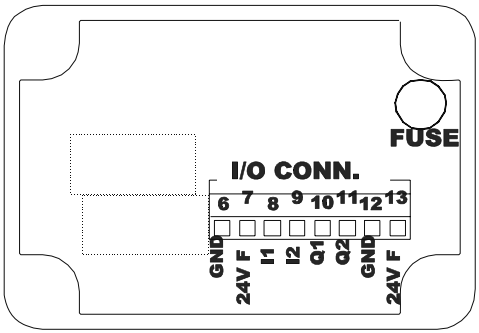


These 4 or 5 communication/supply wires are installed in either of two parallel 5-pole terminal strips in the junction box. The other strip is free for extension wiring to further distributed unit(s).

I/O signals are connected to the 8-pole terminal strip in the box. Two terminals, 6 and 12 are parallel with the supply GND terminals 4a/b of the 5-pole strips. Two other terminals, 7 and 13, are connected to the 24V supply terminals through the internal fuse, thus serving as a separately fused supply for the I/O pins.

The remaining four terminals connect only to the I/O functions in the SIOX module to be plugged in. Terminal 8(I1)=I/O1, 9(I2)=I/O2, 10(Q1)=I/O3 and 11(Q2)=I/O4.

When a proper supply and the SIOX bus are connected to the junction box, the communication can be tested. Unless otherwise requested, the module is preset at the factory to communicate at 4800 bits/s using address 01. General principles for the SIOX bus and communications are described in a separate manual, the "SIOX System Description".

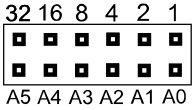


Power Supply.

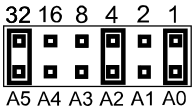
The SD1 can be flexibly supplied from 15V - 35V DC or AC with a peak voltage of 35V. Note, however that a DC supply must be positive with respect to ground to power the internal electronics. An AC supply is only half-wave rectified, limiting the allowable output current on the output terminals.

Address Setup.

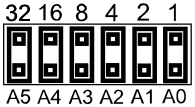
There are two ways of defining each of the 63 addresses for an SD1 module, either through jumpers in the module or by the internal EEPROM in the module. The jumpers consist of six pairs of pins marked A0 - A5 and up to 6 jumper blocks. If any combination of jumpers except all six installed or all six removed is used at power-up, the module will choose this jumper combination as the correct address.



= 63 : Illegal, will use EEPROM definition



= 26 : Valid address (16 + 8 + 2 = 26)



= 00 : Illegal, will use EEPROM definition.

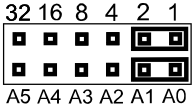
The jumper positions A0 - A5 contribute their values 1, 2, 4, 8, 16 and 32 when the corresponding jumper is removed.
All jumpers installed would generate the invalid slave address 00, and all jumpers removed would be equal to the illegal jumper address 63. In this case, the module checks its internal parameter Ø1 for a valid address number (which could be address 63). Should an invalid address be found, address 63 will be selected.

The selected address, either from the jumpers or the EEPROM, is finally saved in the RAM parameter Ø1 and used for all subsequent communications until this parameter is changed or a new power-up is performed.

Changing the RAM address can be done from the master or from the local PLC program in the module, but make absolutely certain to avoid collision with other modules on the bus.

A special feature is added to help recover "lost" modules, i.e. when an unknown bitrate and/or address is selected or the PLC runs a program that erroneously alters parameters affecting the communication. To recover such a module, carry out the following steps:

1. Disconnect power.
2. Remove all address jumpers except for A0 and A1 but **rotate** these two jumpers 90° from their normal position. Please refer to the figure below.



3. Apply power. The module will now communicate at 4800 bits/s using address 63 with the PLC and any options disabled.
4. Check and reconfigure the module for proper operation.
5. Restore correct jumper address.

Parameter Ø1: (0100_{16})	(refer to page 12)
** *****	00 0001_2 - 11 1111_2 = Module address, (01_{16}-$3F_{16}$)

Communications.

SD1 communicates as a slave in normal SIOX buses using speeds from 1200 to 19200 bits/second. To change speed, send a Setup String command setting the station's EEPROM parameter 00. Note, that, except with the auto-speed setting, the speed will not change until after a power-down/power-up cycle has been carried out or a Soft Reset ($FFFF_{16}$) in this parameter. If the current speed or address is unknown, use the Visual Setup PC program to find the module.

Parameter 00: (2000_{16}) (refer to page 11)	
****** ****** ****** ******	$FFFF_{16}$ = Soft Reset copies EEPROM to RAM.
☐☐☐ ****** ☐☐☐ ☐☐☐	0000_2 = Auto speed detection 1200-19200 bits/second 0101_2 = 1200 bits/second transmission speed 0110_2 = 2400 bits/second transmission speed 0111_2 = 4800 bits/second transmission speed 1000_2 = 9600 bits/second transmission speed 1001_2 = 19200 bits/second transmission speed

SIOX Message Transfer.

Two types of SIOX messages are accepted: Data Mode or String Setup Mode.

A Data Mode Communication is a minimum two-way communication between the central and a module. Data Mode affects only parameter 05, 08 and 09.

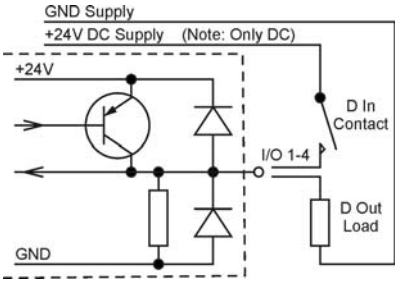
String Mode Communications use the same address as Data Mode but permit access to all functions in the module.

Data Mode transfers are less reliable than String Mode, and in some cases a Data Mode message could inadvertently change an output. Therefore, setting parameter 00 bit13 to 1 inhibits any changes by Data Mode, although a correct answer will still be returned. As an additional safety, changes to the outputs are also inhibited for as long as many of the last transfers are invalid due to noise or wrong bitrate.

Parameter 00: (2000_{16}) (refer to page 11)	
☐* ☐☐☐ ☐☐☐ ☐☐☐	1 = Inhibit Data Mode to prevent output changes due to communication noise.
☐☐☐ ☐☐☐ ☐☐☐ ☐☐☐	0 = 1 character expected in Data Mode (7bit data) 1 = 2 character expected in Data Mode (14bit data)

Inputs / Outputs.

SD1 comprises 4 digital I/O, each of which can be selected in software as an input or output. This is set in parameter ØA.
The I/O pins enabled as outputs can be set or cleared by changing corresponding bits in the RAM parameter Ø8, using String Mode. Alternatively the Data Mode data from the central computer changes the last 7 or 14 bits of this parameter. The status of all 4 I/O signals are always readable as the 4 last bits in parameter Ø9.



Parameter Ø8: (0000_{16}) (refer to page 12)	
□□□ □□□ □□□ ■□□□	1 = Digital output 4 activation.
□□□ □□□ □□□ □■□□	1 = Digital output 3 activation.
□□□ □□□ □□□ □□■□	1 = Digital output 2 activation.
□□□ □□□ □□□ □□□■	1 = Digital output 1 activation.
Parameter Ø9: (0000_{16})	
□□□ □□□ □□□ ■□□□	1 = Indicate digital input 4 active.
□□□ □□□ □□□ □■□□	1 = Indicate digital input 3 active.
□□□ □□□ □□□ □□■□	1 = Indicate digital input 2 active.
□□□ □□□ □□□ □□□■	1 = Indicate digital input 1 active.
Parameter ØA: (0000_{16})	
□□□ ■□□□ □□□ □□□	1 = Enable I/O4 as output.
□□□ □■□□ □□□ □□□	1 = Enable I/O3 as output.
□□□ □□■□ □□□ □□□	1 = Enable I/O2 as output.
□□□ □□□■ □□□ □□□	1 = Enable I/O1 as output.

Output Short Circuit.

The short circuit protection senses the output current every 1ms and turns off overloaded outputs. Overloaded outputs are flagged in a separate register.

When first activated, an output will be left on for a period of 1ms. After this time the output is checked. If, at that time the output is still below a reference level, the output is regarded as short-circuited and will be deactivated. This short-circuit check cycle is repeated four times per second until the short is removed, hereby reducing the heat build-up in the output stage to a negligible level.

If the load capacitance is too large, it might not be possible to activate the corresponding output, because the output stage will not have enough time to charge the capacitance before short-circuit is checked. Try reducing parameter 1Ø, which also may be necessary for extremely low supply voltages.

Parameter Ø8: (0000_{16}) (refer to page 12/13)	
▯▯▯ ▯*▯▯ ▯▯▯ ▯▯▯	1 = Indicate short circuit on active DO4.
▯▯▯ ▯▯*▯ ▯▯▯ ▯▯▯	1 = Indicate short circuit on active DO3.
▯▯▯ ▯▯▯* ▯▯▯ ▯▯▯	1 = Indicate short circuit on active DO2.
▯▯▯ ▯▯▯* ▯▯▯ ▯▯▯	1 = Indicate short circuit on active DO1.
Parameter 1Ø: (7050_{16})	
▯▯▯▯ ▯▯▯▯ ▯▯▯ ▯▯▯	Short circuit level, 00_{16} - $E9_{16}$ for 0 - 35 V.

Flash Output 1, Compatible with R01.

An older module, R01, contained 2 inputs and 2 outputs. To closely simulate this module, I/O3 and 4 should be defined as outputs in parameter Ø8, see previous page. In order to handle only two outputs in DataMode, select the option ØØØ1 in parameter Ø2. The R01 also used the non-standard parameter Ø5 for I/O handling in StringMode. Setting the same bits in this module will then activate the same DO terminals as for R01. For further compatibility, when parameter Ø5, bit10 is set, the DO3 starts flashing with a period determined by parameter Ø1. The minimum period is approximately 25ms and the maximum 6,4s. Note that when changing the period, the module address contained in the same parameter Ø1 must be included in the string message.

Parameter Ø1: (0100_{16}) (refer to page 12)	
▯▯▯ ▯▯▯ ▯▯▯▯ ▯▯▯▯	Flash period 25ms - 6400ms in step of 25ms. When bit10 in parameter Ø5 and bit8 in parameter ØA are set to 1, DO3 flashes for 01_{16}-FF_{16} ; 00_{16} = do not flash.
Parameter Ø2: (0000_{16})	
▯▯▯ ▯▯▯ ▯▯▯▯ ▯▯▯▯	01_{16} = Option to let Data Mode set and read only two outputs, DO3 and DO4 for pinout compatibility with R01.
Parameter Ø5: (0000_{16})	
▯▯▯ ▯*▯▯ ▯▯▯ ▯▯▯	1 = Flash DO3, rate set in parameter Ø1 (bit7-bit0).
▯▯▯ ▯▯*▯ ▯▯▯ ▯▯▯	1 = Activate DO4.
▯▯▯ ▯▯▯* ▯▯▯ ▯▯▯	1 = Activate DO3.
Parameter ØA: (0000_{16})	
▯▯▯ ▯*▯▯ ▯▯▯ ▯▯▯	1 = Enable DO3 as output.
▯▯▯ ▯*▯▯ ▯▯▯ ▯▯▯	1 = Enable DO4 as output.

Output Watchdog Timeout.

In the event of an extended communication error, some outputs, e.g. controlling motors, must be able to turn off. The watchdog timeout is restarted at the preset value each time a correct communication with the module is received. PLC controlled outputs masked in parameter Ø4 are not turned off.

Parameter Ø3: (0000_{16})	(refer to page 12)
**** ****	Output Watchdog, 0,25 - 63s in step of 250ms, turning off the outputs when no communication with the module has occurred during the timeout period. 01_{16}- FF_{16}, 00_{16} = no communication-watchdog.

Input Edge Triggering.

Contact closures, alarms etc. may have very short duration and no longer be active when the central communicates with the SD1. Setting up either DI to the "triggered active" mode permits reading of the completed event. The active input state is then only cleared when a valid read of the inputs has been communicated. SD1 detects this by looking for another parameter or station communication after the read. If the input is still active (including debounce time), the active level is not cleared.

Parameter ØA: (0000_{16})	(refer to page 13)
---*	1 = Enable edge triggered input 4.
--*-	1 = Enable edge triggered input 3.
-*--	1 = Enable edge triggered input 2.
*---	1 = Enable edge triggered input 1.

Input Inversion.

Each input can be set individually to invert input data. Because of this, the terms inactive and active are used instead of high and low, 1 and 0, etc. In the normal non-inverted mode an active input corresponds to voltages above the threshold voltage and vice versa for inverted mode.

Parameter ØB: (0000_{16})	(refer to page 13)
---*	1 = Invert input 4.
--*-	1 = Invert input 3.
-*--	1 = Invert input 2.
*---	1 = Invert input 1.

Input Debounce Time.

The inputs may be connected to mechanical contacts, prone to create bounces, or a delayed activation of an alarm may be required. In such cases, a debounce time > 0 should be set up in this parameter. When a non-zero value is selected, the module checks the inputs several times during the debounce period. A change in the communicated value is then indicated only when all readings correspond. Similarly, the four counters can only increment when such a valid change from passive to active state is detected.

Parameter 03: (0000_{16}) (refer to page 12)	
□□□ □□□ ***** *****	Debounce time 0 -1000ms in step of 4ms, during which time either input must be stable for a change to be register, 00_{16}-FF_{16}.

Input Threshold Level.

The threshold voltage for all inputs can be varied to anywhere between 0,2V (02_{16}) and 35V ($E9_{16}$) above ground. Pulling the input pin to above the threshold voltage activates the software bit that represents the input. The threshold value is set in parameter 10.

Parameter 10: (7050_{16}) (refer to page 13)	
□□□ □□□ ***** *****	Threshold Level for all inputs.

32-bits Counters.

Each time an I/O is activated, one of these counters is incremented. The counters can be read at any time or written to clear or preset them.

Since an increment can occur between the reading of the first and second parameter in a counter, the least significant 16 bits are buffered when the first parameter is communicated. Subsequent reading of the second parameter fetches the buffer data every time until another parameter is accessed. The real counter is, however, incremented correctly.

All counters are saved in EEPROM when the supply falls below 15V.

Parameter 09: (0000_{16}) (refer to page 12/14)	
□□□ □□□ *□□ □□□	1 = Undertension Voltage. Counters saved in EEPROM
Parameter 18: (0000_{16})	
***** ***** ***** *****	Resettable counter 1 (32-bit), Most Significant 16 bits.
Parameter 19: (0000_{16})	
***** ***** ***** *****	Resettable counter 1 (32-bit), Least Significant 16 bits.
Parameter 1A: (0000_{16})	
***** ***** ***** *****	Resettable counter 2 (32-bit), Most Significant 16 bits.
Parameter 1B: (0000_{16})	
***** ***** ***** *****	Resettable counter 2 (32-bit), Least Significant 16 bits.
Parameter 1C: (0000_{16})	
***** ***** ***** *****	Resettable counter 3 (32-bit), Most Significant 16 bits.
Parameter 1D: (0000_{16})	
***** ***** ***** *****	Resettable counter 3 (32-bit), Least Significant 16 bits.
Parameter 1E: (0000_{16})	

****** ****** ****** ******	Resettable counter 4 (32-bit), Most Significant 16 bits.
Parameter 1F: (0000_{16})	
****** ****** ****** ******	Resettable counter 4 (32-bit), Least Significant 16 bits.

Parameter Memory.

The SD1 contains two types of memory: RAM for temporary storage for as long as the module is connected to a power supply, and EEPROM for long-term storage of working modes, parameters and initialization values after a power disconnect. At power-up, the EEPROM variables are automatically copied to the RAM, and the information is used to control the module. All EEPROM setup values may be copied again if data = $FFFF_{16}$ is written to the first parameter number 00. This initiates a full soft reset, using the previous EEPROM value for this parameter.

By using String Mode commands, any variable may be read or modified at any time, either temporarily in RAM or permanently in EEPROM. In the latter case, the corresponding RAM cell is modified as well. Information in controlling parameters immediately affect the function of the module.

Definitions of parameter setup.	
($XXXX_{16}$)	Factory preset information for the parameter.
□□□□	One nibble (4bit), where the left it is most significant bit and the right it is least significant bit.
□□□□ □□□□ □□□□ □□□□	One parameter (2byte)(16bit), where the left it is most significant byte and the right is least significant byte.
*	Only this bit is relevant.
□	This bit is used for other proposes.

Parameter setup (16bits/ parameter):	
Parameter 00: (2000_{16})	
****** ****** ****** ******	$FFFF_{16}$ = Soft Reset copies EEPROM to RAM.
□□* □□□□ □□□□ □□□□	1 = Inhibit Data Mode to prevent output changes due to communication noise
□□□* □□□□ □□□□ □□□□	0 = 1 character expected in Data Mode (7bit data) 1 = 2 character expected in Data Mode (14bit data)
□□□□ ****** □□□□ □□□□	0000_2 = Auto speed detection 1200-19200 bits/second 0101_2 = 1200 bits/second transmission speed 0110_2 = 2400 bits/second transmission speed 0111_2 = 4800 bits/second transmission speed 1000_2 = 9600 bits/second transmission speed 1001_2 = 19200 bits/second transmission speed
□□□□ □□□□ □□** ******	00_{16} = No internal Group address recognition 01-$3F_{16}$ = Optional Group address recognition

Parameter 01: (0100_{16})	
▯▯**** ****▯▯▯▯	00 0001_2 - 11 1111_2 = Module address, (01_{16}-$3F_{16}$)
▯▯▯▯ ▯▯▯▯ ****▯▯▯▯ ****▯▯▯▯	Flash period 25ms - 6400ms in steps of 25ms. When bit10 in parameter 05 is set to 1 and bit10 in parameter 0A is set to 0, DO3 flashes. 00_{16} = no flashing.
Parameter 02: (0000_{16})	
****▯▯▯▯ ▯***▯▯▯▯ ****▯▯▯▯ ****▯▯▯▯	Option reserved for customer specific function
▯▯▯▯ ▯1▯▯▯▯ ▯▯▯▯ ▯▯▯▯	Decode Group address as set in parameter 00.
Parameter 03: (0000_{16})	
*****▯▯▯ ****▯▯▯▯ ▯▯▯▯ ▯▯▯▯	Communications watchdog, 0,25 - 63s in step of 250ms, turning off the outputs when no communication with the module has occurred during the timeout period. 01_{16}- FF_{16}, 00_{16} = no communication watchdog.
▯▯▯▯ ▯▯▯▯ ****▯▯▯▯ ****▯▯▯▯	Debounce time 0 -1000ms in step of 4ms, during which time either input must be stable for a change to be registered, 00_{16}-FF_{16}.
Parameter 04: (0000_{16})	
▯▯*▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯▯	1 = Permit DI1 and DI2 counters in parameters 06/07 to be automatically cleared when read.
▯▯▯▯ ▯▯▯▯ ****▯▯▯▯ ****▯▯▯▯	00_{16} - $7F_{16}$ = PLC controlled outputs, must be cleared to permit communications to modify outputs.
Parameter 05: (0000_{16})	
▯▯▯▯ ▯▯*▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯**▯▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯*▯▯▯▯ ▯▯▯▯	1 = Flash DO3, rate set in parameter 01 (bit7-bit0). 1 = Activate DO4. 1 = Activate DO3.
Parameter 06: (0000_{16})	
*****▯▯▯ ****▯▯▯▯ *****▯▯▯ ****▯▯▯▯	DI1 Counter (16-bit), Only for compatibility with R01.
Parameter 07: (0000_{16})	
*****▯▯▯ ****▯▯▯▯ *****▯▯▯ ****▯▯▯▯	DI2 Counter (16-bit), Only for compatibility with R01.
Parameter 08: (0000_{16})	
▯▯▯▯ ****▯▯▯▯ ▯▯▯▯ ▯▯▯▯	0_{16} - F_{16} = Indication of any short circuits on active outputs DO4...DO1.
▯▯▯▯ ▯▯▯▯ ▯▯▯▯ *▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯*▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯*▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯▯ ▯▯▯*	1 = DO4 activation. 1 = DO3 activation. 1 = DO2 activation. 1 = DO1 activation.
Parameter 09: (0000_{16})	
▯▯▯▯ ▯▯▯▯ ▯*▯▯ ▯▯▯▯	1 = Undertension Voltage. Counters saved in EEPROM

□□□ □□□ □□□ *□□□ □□□ □□□ □□□ □*□□ □□□ □□□ □□□ □□*□ □□□ □□□ □□□ □□□*	1 = Indicate digital input 4 active. 1 = Indicate digital input 3 active. 1 = Indicate digital input 2 active. 1 = Indicate digital input 1 active.
Parameter 0A: (0000_{16})	
□□□ *□□□ □□□ □□□ □□□ □*□□ □□□ □□□ □□□ □□*□ □□□ □□□ □□□ □□□* □□□ □□□	1 = Enable I/O4 as output. 1 = Enable I/O3 as output. 1 = Enable I/O2 as output. 1 = Enable I/O1 as output.
□□□ □□□ □□□ *□□□ □□□ □□□ □□□ □*□□ □□□ □□□ □□□ □□*□ □□□ □□□ □□□ □□□*	1 = Enable edge triggered DI4. 1 = Enable edge triggered DI3. 1 = Enable edge triggered DI2. 1 = Enable edge triggered DI1.
Parameter 0B: (0000_{16})	
□□□ □□□ □□□ *□□□ □□□ □□□ □□□ □*□□ □□□ □□□ □□□ □□*□ □□□ □□□ □□□ □□□*	1 = Invert DI4. 1 = Invert DI3. 1 = Invert DI2. 1 = Invert DI1.
Parameter 10: (7050_{16})	
***** ***** □□□ □□□	Short circuit level for outputs, 00_{16} - FF_{16}.
□□□ □□□ ***** *****	Threshold level for all inputs. 00 = half power supply, +24V
Parameter 11: (0000_{16})	
***** ***** □□□ □□□	00_{16} - $3F_{16}$ PLC program page.
□□□ □□□ ***** *****	00_{16} - FF_{16} = PLC program counter.
Parameter 12: (0000_{16})	
***** ***** □□□ □□□	00_{16} - FF_{16} = PLC timer tick size. 00_{16} = 1/16 s (40_{16} gives the same time as 00_{16}). 01_{16} - FF_{16} = x, x / 1024 s.
□□□ □□□ □*□□ □□□	EEPSH remapping of EEPROM active.
□□□ □□□ □□*□ □□□	Single step done.
□□□ □□□ □□□* □□□	0 = Continuous run. 1 = PLC single step.
□□□ □□□ □□□ *****	0000_2 = PLC stop. 0001_2 - 0100_2 = PLC active task 1...4.
Parameter 13: (0000_{16})	
□□□ *□□□ □□□ □□□	If set, clears PLC edge inputs register, will be cleared automatically.
□□□ □*□□ □□□ □□□	0 = Watchdog not triggered. 1 = Watchdog triggered.
□□□ □□□* □□□ □□□	Valid communication with module has occurred
□□□ □□□ □□*□ □□□	PLC overflow flag L.

□□□ □□□ □□□* □□□	PLC carry flag C.
□□□ □□□ □□□ □□□*	PLC bit accumulator A.
Parameter 14: (0000_{16})	
***** ***** ***** *****	PLC V accumulator, 8000_{16} - $7FFF_{16}$ = -32768 - +32767.
Parameter 15: (0000_{16})	
***** ***** ***** *****	PLC T timer, 0000_{16} - $FFFF_{16}$. Tick rate is defined in parameter 12.
Parameter 16: (0000_{16})	
***** ***** ***** *****	Real Time Clock, Trim and 10ms Counter.
Parameter 17: (0000_{16})	
***** ***** ***** *****	RTC, Seconds Counter or PLC minutes + seconds.
Parameter 18: (0000_{16})	
***** ***** ***** *****	DI1 Counter (32-bit), Most Significant 16 bits.
Parameter 19: (0000_{16})	
***** ***** ***** *****	DI1 Counter (32-bit), Least Significant 16 bits.
Parameter 1A: (0000_{16})	
***** ***** ***** *****	DI2 Counter (32-bit), Most Significant 16 bits.
Parameter 1B: (0000_{16})	
***** ***** ***** *****	DI2 Counter (32-bit), Least Significant 16 bits.
Parameter 1C: (0000_{16})	
***** ***** ***** *****	DI3 Counter (32-bit), Most Significant 16 bits.
Parameter 1D: (0000_{16})	
***** ***** ***** *****	DI3 Counter (32-bit), Least Significant 16 bits.
Parameter 1E: (0000_{16})	
***** ***** ***** *****	DI4 Counter (32-bit), Most Significant 16 bits.
Parameter 1F: (0000_{16})	
***** ***** ***** *****	DI4 Counter (32-bit), Least Significant 16 bits.
Parameter 20 - 3F	
	Free data storage
Parameter 40 - 41	
	Spy, refer to PLC manual.
Parameter 42 - FF	
	Reserved
Parameter 100 - 3FF RAM=reserved, EEPROM=PLC program area	

Electrical Specifications (T_{amb} = 20 °C)				
	Min	Typ	Max	Unit
Power Supply Voltage	15 18	24 20	35 24	V DC V AC
Power Supply Current All I/O off All I/O on, no load		 6 37		 mA mA
Output Current All Outputs together One Output			 950 300	 mA mA
Input Resistance		10		kΩ

Environmental Specifications				
	Min	Typ	Max	Unit
Temperature Range Operating, Low output load Operating, Full Load	 -40 -40		 +85 +55	 °C °C
Storage Temperature Range	-40		+85	°C

Mechanical Specifications		
Case Size R00 Box	94 x 65 x 58	mm
Weight (SD1+ R00 Box)	160	g
Case Size S00 Box	94 x 94 x 58	mm
Weight (SD1+ S00 Box)	200	g
Case Size T00-1 Box	94 x 130 x 58	mm
Weight (SD1+ T00-1 Box)	610	g

Assistance

on safety and technical matters is available from:

TELEFRANG AB
Varbergsgatan 8
S-412 65 GÖTEBORG
SWEDEN

Tel: +46 31 40 30 60
Fax: +46 31 40 20 25
E-mail: info@telefrang.se
Visual Setup Download: www.siox.com