kamstrup

MULTICAL® SIOX Interface Z41

TELEFRANG AB

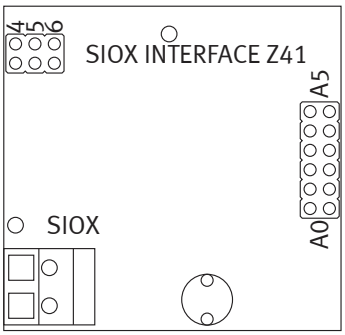
Kamstrup A/S · Industrivej 28, Stilling · DK-8660 Skanderborg · T: +45 89 93 10 00 · info@kamstrup.com · kamstrup.com

Contents

General Description

The SIOX - MULTICAL® Interface board translates values from the meter into values communicated over an SIOX bus. Values are continually updated and may be fetched either as separate parameters or as a text string, compatible, e.g. with most SIOX communicating meters. Communication speed may be selected between 300 and 19200 bits/s.

The two-wire SIOX bus connection is optoisolated from the meter and may be connected without observing polarity. The interface board is powered from the SIOX bus.



Installation

The Z41 Interface Board is snapped into the Heat Meter bottom part so that the two guide pins fit in the board and the 6-pin socket matches the meter connector pins when the case top is installed.

The SIOX bus is connected to the two screw terminals on the board. The bus connection is unpolarized, i.e. the wires may be connected either way. If the cable is screened, the screen is best connected to ground in the central end of the bus and left open at the meter end. SIOX buses do not need screened cabling to operate.

The interface board will be ready for operation immediately after the SIOX bus is connected even when no meter is available, but all data will show zeros.

Addressing

The SIOX bus address of the Z41 can be set in two ways, either through the onboard jumpers marked A0 to A5 or through the internal EEPROM. Each time the electronics is powered-up, the address jumpers on the interface board are scanned. The resulting address is used by the internal CPU to identify when to answer to a call. If the board address should be invalid, either all six jumpers installed or all removed, the CPU checks an internal address set in EEPROM and uses this instead. Should the EEPROM address also be invalid = 0, the CPU will decide on address 63 as the final default. At delivery the EEPROM address is preset to 01.

The jumper positions A0 - A5 contribute their values 1, 2, 4, 8, 16 and 32 when the corresponding jumper is removed.

A special feature is added to help recover "lost" modules, i.e. when an unknown bit rate and/or address is selected. To recover such a module, carry out the following steps:

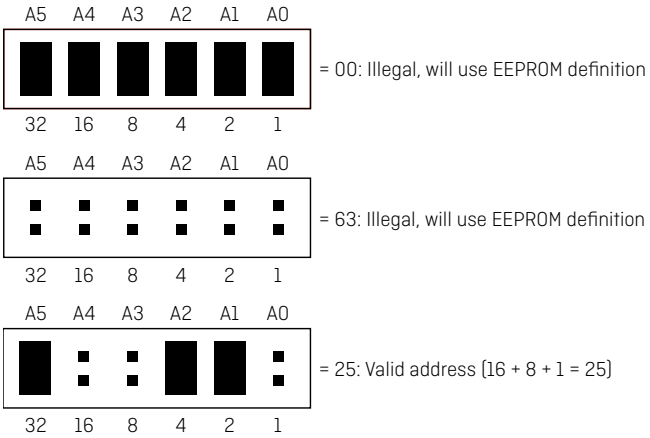
1 Disconnect power.

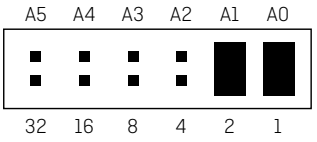
2 Remove all address jumpers except for A0 and A1 but rotate these two jumpers 90° from their normal position. Please refer to the figure to the right.

3 Apply power. The module will now communicate at 4800 bits/s using address 63 with any options disabled.

4 Check and reconfigure the module for proper operation. One way is to use a Xxxsetup.dff for almost any SIOX module found on www.siox.com. At least EEPROM address and Bit rate settings are identical on most module types, no matter which you may have available.

5 Restore the correct jumper address.





Communication Format

All SIOX communications are carried out asynchronously in half duplex mode using ASCII compatible characters containing:

1 start bit = 0; 8 data bits; 1 even parity bit; 1 stop bit = 1

The normal SIOX communication speed is 4800 bits/second, but other speeds between 300 bps and 2400 bps can be set for time critical systems, bus lengths more than 1000 m or for high electrical noise environments. Mixing with the first generation of communicating meters on the same bus, for instance, requires that 300 bps be selected.

At delivery, the module is set to automatically identify the bit rate used by the central. Note that in this mode the module must try all possible rates, which may take up to some 30 seconds depending on how many acceptable and invalid characters the module identifies in the current calls. However, when the module has found the rate used, it will be saved and tried first next time that bus power is applied.

For increased communication safety, it is possible to set the single bit rate that is to be used in all future communications to either 4800, 2400, 1200, 600 or 300 bps by changing parameter 00 from 0000 to a value between 0700 and 0300. The easy way is to use the free program Visual Setup together with Z41Setup.dff found on www.siox.com.

At all times, the module can be identified by the "default" feature in the adress jumpers described above. Cross-connecting two jumpers and applying power sets 4800 bits/s and address 63.

The board acts as a slave on SIOX bus and can, at any instant, communicate in three different ways, the Data Mode, in this unit only used to indicate that a module is present, the String Text Mode for a complete single-communication readout and the String Setup Mode, where a single parameter or code is read or changed in each communication. These modes are detailed in the manual "SIOX System Description".

Messages in String Text Mode

In text mode, the board expects an "empty" string in the message from the bus master. This is compatible with other SIOX communicating meters and is answered by a 67-character text, where each character hex 7-7F typically represents four bits of a hexadecimal value. The answer is terminated by a sign-off character, identical to that in the call frame from the central, and a checksum character.

Example Communications in String Text Mode:
Command message to SIOX address 9:
C0 49 BC 7A

Answer message:

0	*1*	*2*				*6*				*10*				*14*			
02	71	70	76	7F	71	71	7A	74	70	7F	7B	7A	71	7C	70	72	
17	*18*			*21*			*24*					*30*					
78	70	70	70	70	70	70	73	70	78	70	70	70	70	70			
32		*34*						*40*			*43*		*46*				
72	70	75	7B	7F	73	70	70	70	70	70	70	70	70	75	79	70	71
50		*52*	*53*	*54*	*55*				*59*		*61*						
79	70	71	79	74	70	74	7F	71	74	70	73	75	71	7F	75	00	
67	*68*																
BC	66																

The text characters 0 - 66 in the answer above contain a mix of values fetched from the meter (underlined) and data fetched from the EEPROM of the option board:

Char nr	Description	
0	Version number (typically hex 02)	
1	Internal information	
2	Possible error code when character 17, bit 1 is set	
2 – 5	Forward temperature, resolution 0.01°C, 16-bit hex	
6 – 9	Return temperature, resolution 0.01°C, 16-bit hex	
10 – 13	Temperature diff., resolution 0.01°C, 16-bit hex	
14 – 16	Internal information	
17	Bit1 = 1 (hex 72) indicates an error defined in char. 2	
18 – 20	Flow, 12-bit hex, resolution 1 - 0.001 m^3/h	
21 – 23	Internal information	
24 – 29	Volume, 24-bit hex, resolution 1 - 0.001 m^3	
30 – 31	Internal information	
32 – 3	Optional high resolution volume	
34 – 39	Energy, 24-bit hex, resolution 1 - 0.001 GJ, MWh or kWh	
40 – 42	Power, 12-bit hex, resolution 1 - 0.001 MW or kW	
43 – 45	Internal information	
46 – 49	Optional high resolution energy	
50 – 51	SIOX bus address	
52	Bit-mapped	111 00xx = kW Power unit
		111 01xx = MW Power unit
		111 0x00 = MWh Energy unit

Char nr	Description	
		111 0x01 = kWh Energy unit
		111 0x1x = GJ Energy unit
53	Bit-mapped	111 00xx = 0 decimals for Volume
		111 01xx = 1 decimals for Volume
		111 10xx = 2 decimals for Volume
		111 11xx = 3 decimals for Volume
		111 xx00 = 0 decimals for Energy
		111 xx01 = 1 decimals for Energy
		111 xx10 = 2 decimals for Energy
		111 xx11 = 3 decimals for Energy
54	Bit-mapped	111 00xx = 0 decimals for Flow
		111 01xx = 1 decimals for Flow
		111 10xx = 2 decimals for Flow
		111 11xx = 3 decimals for Flow
		111 xx00 = 0 decimals for Power
		111 xx01 = 1 decimals for Power
		111 xx10 = 2 decimals for Power
		111 xx11 = 3 decimals for Power
55 – 58	Future energy divider	
59 – 60	Future volume divider	
61	Installation year code 0 - 9	
62 – 65	Installation date code 1 - C, 1 - 1F	
66	Internal information, normally 00	

Note, that all values are transmitted with the last, least significant 4-bit character first in each group, with the exception of meter number.

Messages in String Setup Mode

The Z41 contains two types of memory: RAM for temporary storage for as long as the module is connected to a live bus, and EEPROM for long-term storage of working modes, parameters and initialization values when the module is disconnected. At power-up, the EEPROM is automatically copied to the RAM, and the information is used to control the module. Using String Mode Setup commands, any variable may be read or modified at any time, either temporarily in RAM or permanently in EEPROM. In the latter case, the correspon-ding RAM cells are modified as well. Since data fetched from the meter is stored in specific RAM parameters, most normal variables in the meter can be read, one by one as parameters. ID-code and error flags can be changed as well, by using write commands.

The string from the central must contain a parameter number, typically two characters - 1F. A communication for reading the Forward Temperature parameter 1 in String Mode will be:

From central:	**C**	**9**	**31**	**3**	**BC**	**59**
	Address 9		1	Sign-off/Checksum		

Parameter 1 read

Answer from Z41:	**30**	**37**	**44**	**30**	**BC**	**68**
	0	7	D	0	Sign-off/Checksum	

Temperature = hex7D0 = 2000 = 20.00°C

Parameters

A "SIOXUSER" test and setup DOS program is available to read and change parameters, as well as a Visual SIOX Windows program. They are run on an IBM PC compatible equipped with an SIOX adapter (K32, U32 etc).

Below follows a detailed description of each parameter. When in doubt about a setting, select as a "least dangerous" alternative.

Pos.	Value	Function (all values in hexadecimal notation)
00	FFFF	Reset. An attempt to set FFFF restarts the whole interface without changing previous value.
	8xxx	Test Monitor ON, permits writing all parameters.
	1xxx	Double Character Data Mode for compatibility with other SIOX modules.
	x0xx-	Transmission Speed: Automatic selection.
	x3xx-x7xx	Transmission Speed: 7 =4800, 6 = 2400, 5 = 1200, 4 = 600, 3 = 300 bits/s. Other values are invalid. To change, an EEPROM WRITE must be made, followed by a power down/power-up or setting the parameter to FFFF temporarily.
	xx00	No Group is defined, allowing 63 different addresses.
	xx01-xx3F	Group Address definition, allowing the module to identify an extra adress (only when Option x8xx is set). Note that buses may have problems with supplying current to many modules. In this case it is probably better to set Group = 00 and let expansion modules (R30) handle the groups.

Pos.	Value	Function (all values in hexadecimal notation)
01	1xx-3Fxx	Station Address 1-63.
	xx4x	Meter Connected Set after a valid communication between meter and interface.
02	0000-FFFF	Options for specific customers. Normally = 0000. Option 11 permits one single communication between meter and interface, as set in parameter 3.
03	01xx-FFxx	Interface Update Interval from 5 s to 20 min. Too frequent updates may empty the meter battery.
04-06	0000-FFFF	User ID Fetched from the meter.
07	000-1F3	Program Number Contains CCC=000-499.
08-09	0000-FFFF	Hours Counter.
0A	xx00-xxFF	Meter Alarms: x1xx=Too Many Water Pulses xx8x=Battery Low Warning xxx8=Forward Temp Probe Error xxx4=Return Temp Probe Error xxx2=Missing Water Pulses
0B	VVxx	"SIOX" Meter Version, character 0, typically hex 2.
	xxx0-xxx1	Forward/Return Water Metering.
0C	x4xx	"SIOX" Power Unit = MW instead of kW.
	x2xx	"SIOX" Energy Unit = GJ instead of kWh/MWh.
	x1/0xx	"SIOX" Energy Unit = kWh/MWh.
	xxC/8/4/0x	"SIOX" Volume Decimals = 3/2/1/0.
	xx3/2/1/0x	"SIOX" Energy Decimals = 3/2/1/0.
	xxxC/8/4/0	"SIOX" Flow Decimals = 3/2/1/0.
	xxx3/2/1/0	"SIOX" Power Decimals = 3/2/1/0.
0D	0000-FFFF	"SIOX" Energy Divider, not implemented.
0E	0000-FFFF	"SIOX" Volume Divider, not implemented.
0F		Reserved.
10	0000-FFFF	Forward Temp., 16b hex value, resolution 0.01°C.
11	0000-FFFF	Return Temp., 16b hex value, resolution 0.01°C.
12	0000-FFFF	Difference Temp., 16b hex value, resolution 0.01°C.
13	XXXx	"SIOX" Internal Info, characters 14 - 17.
	xxx2	"SIOX" Error Flag, enables error code in parameter 10.
14	x000-xFFF	Flow, 12-bit hex value, resolution 1 - 0.001 m3/h.
15	xDDD	"SIOX" Internal Info, characters 21 - 23.
16	0000-FFFF	Volume, most significant 8 or 16 bits.
17	0000-FFFF	Volume, least significant 16 bits.
18	xxYY	"SIOX" Internal Info, characters 30 - 31.
19	xxXX	"SIOX" High Resolution Volume, selectable.
1A	xx00-xxFF	Energy, most significant 8 or 16 bits.
1B	0000-FFFF	Energy, least significant 16 bits.
1C	x000-xFFF	Power, 12-bits hexadecimal value.
1D	xXXX	"SIOX" Internal Info, characters 43 - 45.
1E	XXXX	"SIOX" High Resolution Energy, selectable.
1F	XXxx	Bus Address (copy of 1), characters 50 and 51.
	xxYY	"SIOX" Internal Info, character 66, normally hex .
20-21	0000-FFFF	Tariff Limit 2 24-bit hexadecimal value.
22-23	0000-FFFF	Tariff Limit 3 24-bit hexadecimal value.
24-25	0000-FFFF	Quick Figure 7 digits if available.
26-27	0000-FFFF	k * dT 7 digits if available.
28	00x0-FFxF	DD x E 3 digits Display and Tariff Configuration.
29	0000-FFFF	FFGG 4 digits Auxiliary Counters Configuration.
2A-2B	0000-FFFF	Peak Power 24-bits hexadecimal value.

Pos.	Value	Function (all values in hexadecimal notation)
2C-2D	0000-FFFF	Peak Flow 24-bits hexadecimal value.
2E	xx00-xxFF	Current Year xx is normally set to hex14 = century 20.
2F	0000-FFFF	Current Date.
30-31	0000-FFFF	Tariff 2 Counter 32-bit hexadecimal value.
32-33	0000-FFFF	Tariff 3 Counter 32-bit hexadecimal value.
34-35	0000-FFFF	Auxiliary Counter 1 32-bit hexadecimal value.
36-37	0000-FFFF	Auxiliary Counter 2 32-bit hexadecimal value.
38	01xx-1Fxx	Meter Command Character either automatic or single run (parameter 2 set to 0011).
39		Flow/Power Decimals, for information only.
3A	0000-FFFF	Yearly Readout Energy if available.
3B	0000-FFFF	Yearly Readout Volume if available.
3C	0000-FFFF	Yearly Readout Power or Flow if available.

Electrical Characteristics

	Min	Typ	Max	Unit
Bus Voltage	0	18	30	V DC
Supply Current		1.2		mA

Environmental Specifications

Operating/Storage Temperature (Non-condensing)	-20	+75	°C

Mechanical Specifications

Case Size	43 x 44	mm
Weight	14	g

Revisions

Rev. 0 First Production

Kamstrup info

Conclusion English

SIOX Z 41 interface to MULTICAL® 61/601/602/ 801.

SIOX is a seriell unpolarised 2-wirebus for communication of SIOX-components that is mutual parallel connected on the signal cable-bus.

Superior system is for example Mcom, Fix and Telefrang Whose function we refer to the respective supplier.

SIOX Z 41 interface translates MULTICAL® 601/801 KMP-protocol to SIOX-protocol.

SIOX-protocol for energi/water meter follows "defacto-standard SVM-820"

With energy, volume, inlet-outlet-difference temperatures, actual flowrate, actual thermal power, with same units and decimal placing as the display on MULTICAL® 61/601/602/801.

Futhermore info codes, hour counter and serial number can be read, however outside the "SVM 820 defacto-standard".

SIOX Z 41 is provided with "Autodetect-baudrate within the span 300-600-1200-2400-4800 baud", consequently adjusts it self on superior systems baudrate, within app. 1 minute.

SIOX Z 41 can also be set on a fixed baudrate via the SIOX-tool "Kamstrup Heat Meter Inspector-S-K32" and a Windows based Pc.

SIOX-adressing in EEPROM within address range 1-62 is made by jumpers A0-A5, and after adressing the Z41 disconnects to the power, and connects to the power again after app. 10 seconds.

"Wildcard search" is made by cross-set Jumper A0-A1 and remove the rest of the jumpers and search with "SIOX-tools Kamstrup Heat Meter Inspector-S-K32" and a Windows based Pc on SIOX-adress 63 and 4800 baudrate.

In this mode Z41 answers by showing it's current baudrate and EEPROM-adress.

Z41 works in calculator MULTICAL® 601 (without 67-06 compatibility module) MULTICAL® 602 ,
MULTICAL® 801, and water meter MULTICAL® 61.

W41 should be used in calculator Danfoss EEM-C/MULTICAL® III/CDE and MULTICAL® 601 with 67-06 compatibility module.

Kamstrup info

Sammanfattning Svenska

SIOX Z 41 interface till MULTICAL® 61/601/602/ 801.

SIOX är en seriell opolariserad 2-trådsbuss för kommunikation av SIOX-komponenter som inbördes är parallellkopplade på signalkabelbussen.

Överordnade system är t.ex. Mcom, Fix och Telefrang

Vars funktioner vi hänvisar till respektive leverantör.

SIOX Z 41 interface översätter MULTICAL® 601/801 KMP-protokoll till SIOX-protokoll.

SIOX-protokoll för energi/vattenmätare följer "defacto-standarden SVM-820 med energi, volym, fram-retur-differenstemperatur-momentant flöde-momentan effekt, med samma enheter och decimalplacering som displayen på MULTICAL® 61/601/602/801.

Dessutom kan infokoder, drifttid och mätarnummer utläsas, men följer ej SVM 820 defacto-standard.

SIOX Z 41 är försedd med "Autodetect-baudrate inom spannet 300-600-120—2400-4800 baud", alltså ställer in sig på överordnat systems baudrate, inom ca 1 minut.

SIOX Z 41 kan också ställas in på fast baudrate via SIOX-verktygen Kamstrup Heat Meter Inspector-S-K32 och Windowsbaserad Pc.

SIOX-adressering I EEPROM inom adressområdet 1-62 görs med hjälp av jumpers A0-A5, och efter adressering skall Z41 göras spänningslös, för att sedan spänningsättas igen.

"Wildcard sökning" kan ske genom att tvärställa Jumper A0-A1 och avlägsna resten av jumprarna och söka med SIOX-verktygen Kamstrup Heat Meter Inspector-S-K32 och Windowsbaserad Pc på SIOX-adress 63 och 4800 baud.

I det läget svarar Z41 med att visa sin aktuella baudrate och EEPROM-adress.

Z41 fungerar I integreringsverken MULTICAL® 601 (utan 67-06 kompatibilitetsmodul) MULTICAL® 602 och MULTICAL® 801, samt vattenmätaren MULTICAL® 61.

W41 används till Integreringsverken Danfoss EEM-C/MULTICAL® III/CDE och MULTICAL® 601 med 67-06 kompatibilitetsmodul.