Bologna, 06/06/2003

Re: **THERMOSALD – ISC / RS485**
DESCRIPTION OF THE SERIAL INTERFACE 485 PROTOCOL

THERMOSALD HARDWARE STRUCTURE

The THERMOSALD ISC/RS485 temperature regulator can control both the standard display panel and serial interface 485.
Connector CN4: Display Panel (15 pin female standard connector)
Connector CN5: Interface RS485 (9 pin female additional connector)
(CN5/3=channel A- ; CN5/8= channel B+)

INTERFACE PARAMETERS

Baud Rate = 9600
8 data bit + 1 start + 1 stop bit
parity = no

FUNCTIONS

When switched ON, the temperature regulators place themselves in receiving mode, waiting for a signal from the supervisor. In order to work, each temperature regulator must have a recognisable logic address as described below.
When it recognises a relevant message, the signal of 485 is received by the temperature regulator after a 40 ms pause from when the message was received and a response is given at the end of reception after 200 ms. At the end of the response and after 40 ms the signal of 485 is sent back.
The temperature values exchanged with the temperature regulator are expressed in degrees centigrade. Any conversions into Fahrenheit are shown on the display panel and/or in the Controller where required.

- Logic address assignment:

When the equipment is put into service it is necessary to assign the logic address to the temperature regulator.
1 – On the display panel one can assign a logic address from 0 to 7 (this logic address must be written in the MACHINE DATA and that of the temperature regulator).
2 – From the Controller one can assign the logic address from 0 to 7 by simply supplying one temperature regulator at a time and then sending a message from the serial interface as described below.

- Reading/writing the parameters:

The temperature regulators always remain in receiving mode waiting to be brought into communication. The temperature regulators are only authorised to answer the requests from the controller who remains the “manager” of the message.
The Controller can read the RUN TIME data or read/write the MACHINE DATA and/or SETTINGS DATA, all together or one at a time.

Every message sent to the temperature regulator is decoded by the temperature regulator itself. If data is read it is sent back to the Controller. If, on the other hand, it is written, the data is sent back to the Controller in the same way, as an ECHO, so that the Controller can check that is correct. If it is a command, it will be sent back to the Controller, as an ECHO, so that the Controller can check that is correct. With this response, Field 4 of the message is modified from “Q” to “R”.

- Master reset when put into service:

When a Master Reset is done, it’s necessary setting the thermoregulator address; next the diagnostic message nr. 35 CALIBRATING REQUEST appears to advice the operator.

- Calibrating:

When a calibrating is done, the diagnostic message nr. 36 CALIBRATING IN PROGRESS appears; at the end the thermoregulator is ready to work.

- Calibrating with the assistance of a probe for measuring the sealer temperature:

With high precision machines, with the assistance of a temperature sensor on the sealer connected to the Controller, one can enter the instant balancing temperature on the temperature regulator and then execute the automatic balancing.

PC SIMULATOR SUPERVISOR
Mod: THERMOSALD_485
Code: 3ESD0075

The package comprises:
1 Interface Box RS232 (Com 1) – RS485
1 software THERMOSALD_485 CDROM (Run Time)

NOTE: The package uses the interface signal DTR =1 and/or RTS=1 to enable transmission RS485, DTR=0 and RTS=0 to enable the receiving function.

TRANSMISSION PROTOCOL
The numbers transmitted are in ASCI Code.

0	Start of Message	%	(HEAD)
1	Temperature regulator address	0-7, $	($30+0 - $30+7)
2	MESSAGE NUMBER tens	(same for question and response)	
3	MESSAGE NUMBER tunits		
4	Type	Q=Question / R=Response	
5	Nr. Data tens	99=all data ; No.=single data item	
6	Nr. Data units		
7	Not used		
8	Data0_hundreds	XX	(DATA)
9	Data0_tens	XX	
10	Data0_units	XX	
11	Data1_hundreds	XX	
12	Data1_tens	XX	
13	Data1_units	XX	
	Data2_hundreds	XX	
	Data2_tens	XX	
	Data2_units	XX	
	…….		
	…….		
	…….		
	End of Message	LF	(END)

1) Start of message
Asci character %

2) Temperature regulator address
Asci Characters 0-7
Asci Characters $ to program the address (in this case the value of the address is the DataO of the message byte 8,9,10: Data0_hundreds, Data0_tens, Data0_units).

3a) Message transmission codes, Controller end (Master)

- Message code, Write LOGIC ADDRESS 10
- Message code, Write MACHINE DATA 11
- Message code, Write DATA SETTINGS 12
- NOT USED 13
- Message code, Write CLEAR FAULTS 14
- Message code, Write AUTOMATIC BALANCING 15
- Message code, Write WRITE DATA ON EEPROM 16
- Message code, Write READ DATA ON EEPROM 17
- Message code, Write COMMISSIONING DATA 18
- Message code, Read MACHINE DATA 51
- Message code, Read SETTINGS DATA 52
- Message code, Read RUN TIME DATA 53
- Message code, Read START-UP DATA 58
- Message code, Read MASTER RESET 99

3b) Message transmission codes, Temperature regulator end (Slave)

- Same as transmission codes for the Controller end

4) Type

Q=Question asked by Master Controller
R=Response by Slave temperature regulator

5) Data

According to the message

6) End of the message

LF Asci Character

LIST OF DATA ITEMS (default data on use and maintenance manual)

MACHINE DATA		
Not used	**0**	[xxx]
Heating ramp, Degrees/10ms	**1**	[xxx]
KV GAIN	**2**	[xxx]
KINT Gain (x10)	**3**	[xx.x]
KINT switching-on threshold	**4**	[xxx]
00C = ℃ / 00F = °F	**5**	[xxx]
50 / 60 Hz	**6**	[xxx]
Maximum sealing time (x 10)	**7**	[xx.x]
Part. Short. circ. factor (x10)	**8**	[xx.x]
Disabling 1 fault	**9**	[xxx]
Nominal I current	**10**	[xxx]
KD Gain	**11**	[xxx]
1 = cold struct. comp.	**12**	[xxx]
1 = serial enabling	**13**	[001]
Heat-sealer address	**14**	[xxx]
Disabling 2 fault	**15**	[xxx]
	16	[xxx]
	17	[xxx]
	18	[xxx]
	19	[xxx]
	20	[xxx]
Burn-in Temperature (℃)	**21**	[xxx]
Burn-in Heating-up time (sec.)	**22**	[xxx]
	23	[xxx]
	24	[xxx]

SETTINGS DATA (default data on use and maintenance manual)

Internal data item	**0**	[xxx]
Internal data item	**1**	[xxx]
Internal data item	**2**	[xxx]
Internal data item	**3**	[xxx]
Internal data item	**4**	[xxx]
Heating Factor (x100)	**5**	[xxx]
Internal data item	**6**	[xxx]
Internal data item	**7**	[xxx]
Internal data item	**8**	[xxx]
Internal data item	**9**	[xxx]
Internal data item	**10 (A)**	[xxx]
Maximum working temperature (℃)	**11 (B)**	[xxx]
Cooling Gradient when balancing (degrees/10sec.)	**12 (C)**	[xxx]
Sealer temperature for balancing (℃)	**13**	[xxx]
Set pre-heating temp. (℃)	**14**	[xxx]
Set sealing temp. (℃)	**15**	[xxx]

RUN TIME DATA (default data on use and maintenance manual)

Not used	**0**	[xxx]
Current Temperature (℃)	**1**	[xxx]
Fault/warning number (u)	**2**	[xxx]
Maximum current (A x 10)	**3**	[xx.x]
Resistance (ohm x 100)	**4**	[x.xx]
Actual voltage (volts)	**5**	[xxx]
Power (VA/10)	**6**	[xxx0]

SERVICE DATA (default data on use and maintenance manual)

Sealing plate width (mm x 10)	**0**	[xx.x]
Sealing plate thickness (mm x 100)	**1**	[x.xx]
Wire gauge (mm x 100)	**2**	[x.xx]
Sealing plate length (mm)	**3**	[xxx]
No. of sealing plates in parallel (u)	**4**	[xxx]
No. of sealing plates in series (u)	**5**	[xxx]
Ohm x sq.mm / m (x 1000)	**6**	[xxx]
Amperage / sq.mm (A/mmq)	**7**	[xxx]
Duty cycle (x 10)	**8**	[xx.x]
Max. theoretical current (A)	**9**	[xxx]
Theoretical resistence (ohm)	**10**	[x.xx]
Theoretical voltage (V)	**11**	[xxx]
Theoretical power (VA / 10)	**12**	[xxx0]
Set max. current (A)	**13**	[xxx]
Set resistance (ohm x 100)	**14**	[x.xx]
Set voltage (V)	**15**	[xxx]
Set power (VA / 10)	**16**	[xxx0]