ACE SL7000
Real Time Data Acquisition
Application Note

This application note is provided to illustrate and explain the flexibility in addressing real-time applications with the ACE SL7000 meter.

Model: ACE7000
Type: ACE SL761
Firmware versions: v5.15 or later

ACE AIMS_PRO V 5.7.2

NOTE: This document is relevant to the hardware and software listed in the table above. For assistance, please contact Support Services.
Email: support.services@actaris.itron.com or Tel: +44 1394 605 190.

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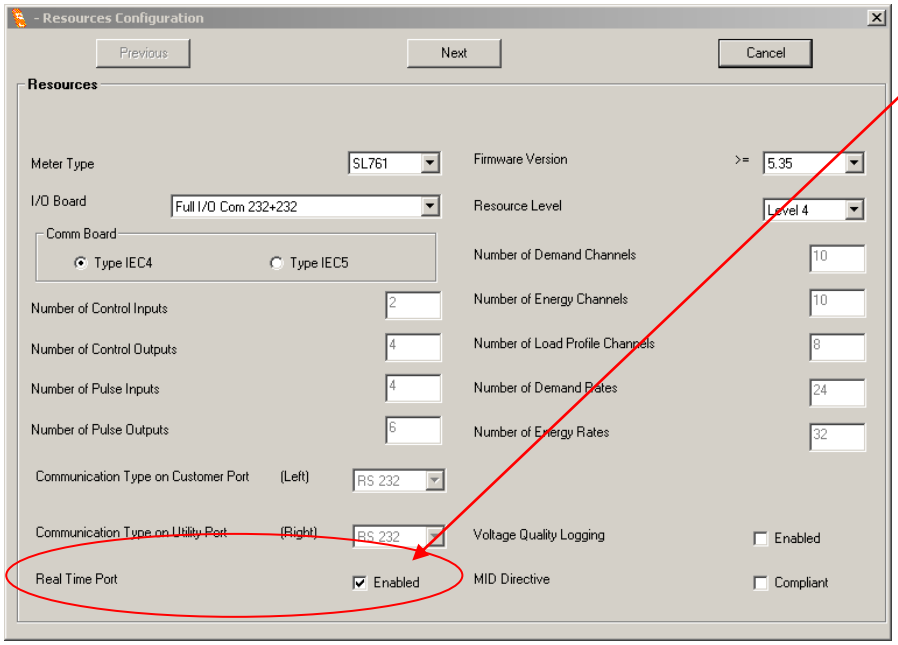
Introduction

The ACE SL7000 Real Time Port is provided to enable real time data reading via a serial port.
Several data events can be retrieved and collated in real time using end customer software.

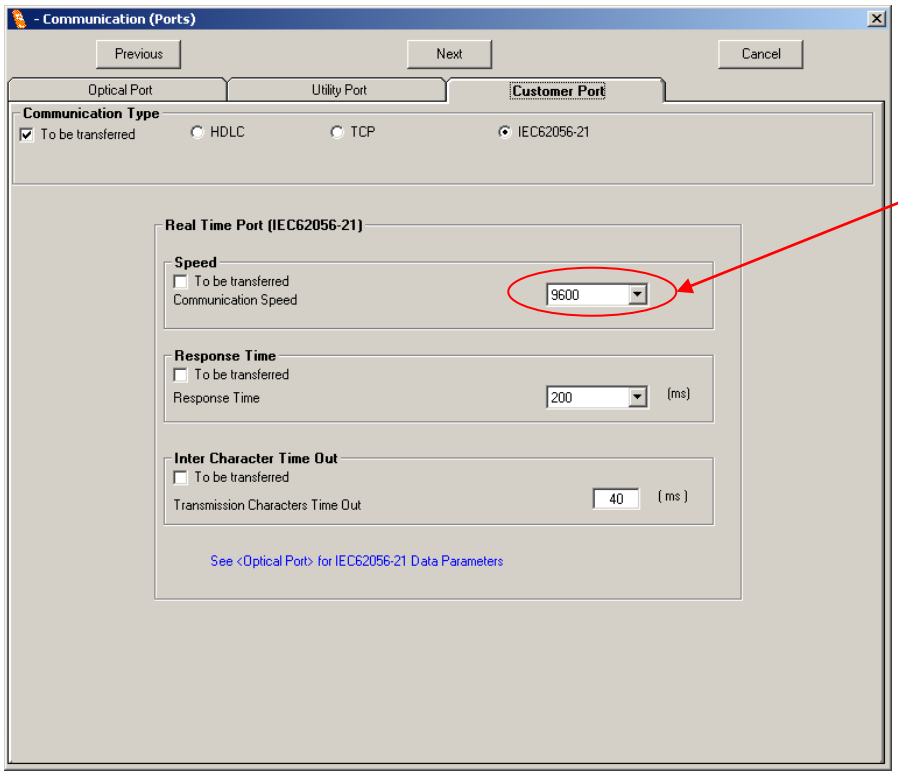
Communication Settings

Enable Real Time Port



From the Configuration sidebar, select **Resources** and verify that the real time port is enabled.

Select IEC62056-21

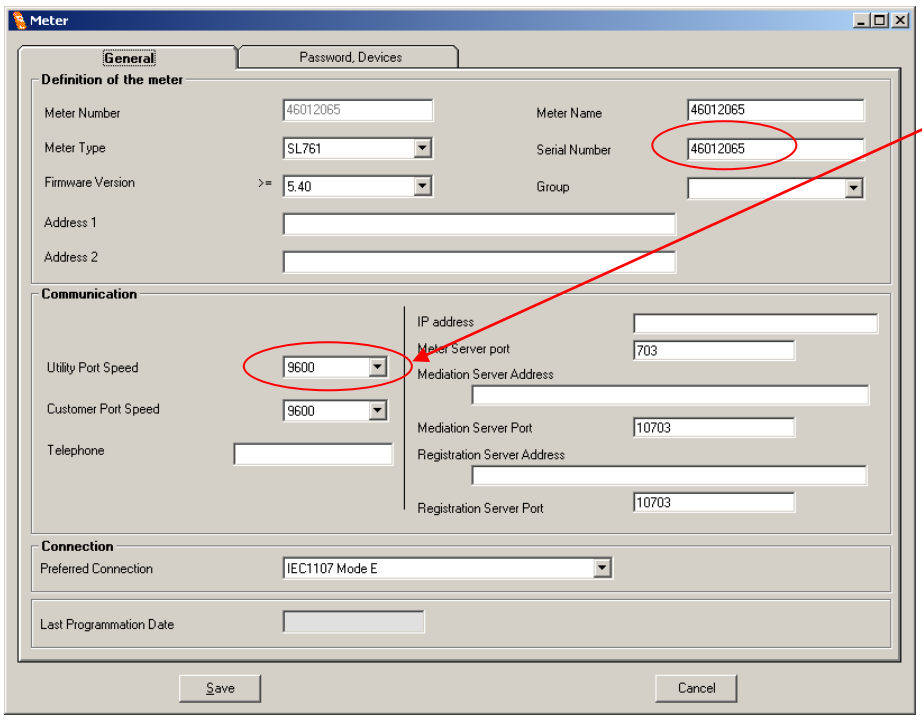


From the sidebar, select **Communication (Ports)**.

Select IEC62056-21in either *utility port* or *customer port*
The transfer speed can be adjusted up to a maximum of **19200** Bauds.

- Note – Only one port (either customer or utility) can be configured as a real time port.

Verify Port Speed Settings

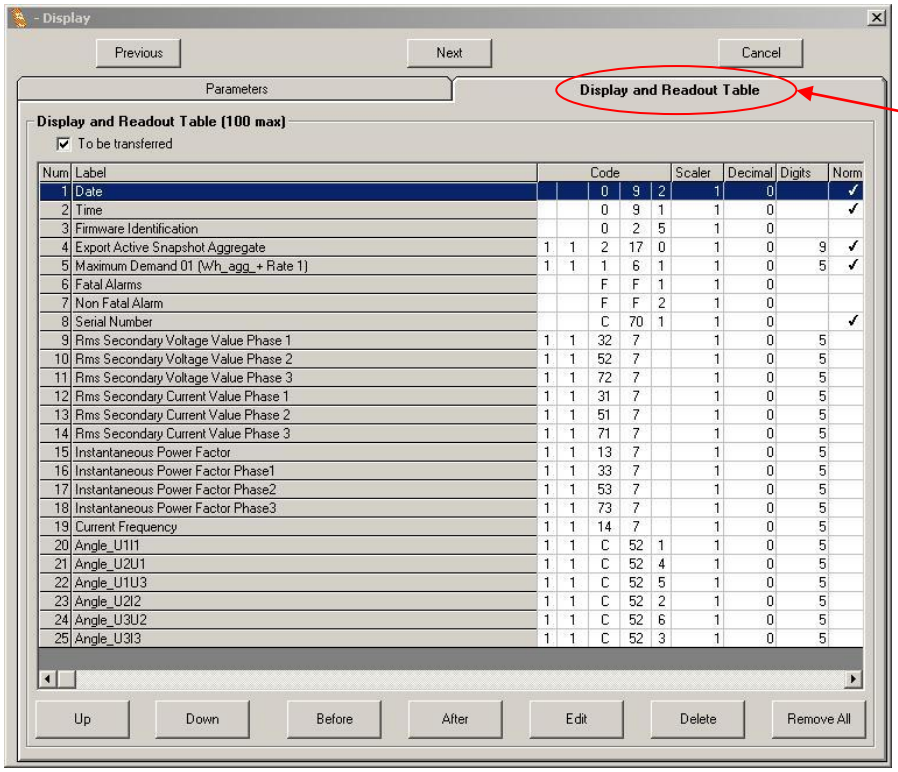


The port speed indicated on the **General** screen should reflect that programmed in **Resources**.

The **Serial Number** functions as the device address.

Real-Time Data Set Selection

Programme Data Set



Num	Label			Code			Scaler	Decimal	Digits	Norm
1	Date			0	9	2	1	0		✓
2	Time			0	9	1	1	0		✓
3	Firmware Identification			0	2	5	1	0		
4	Export Active Snapshot Aggregate	1	1	2	17	0	1	0	9	✓
5	Maximum Demand 01 (Wh_agg_+ Rate 1)	1	1	1	6	1	1	0	5	✓
6	Fatal Alarms			F	F	1	1	0		
7	Non Fatal Alarm			F	F	2	1	0		
8	Serial Number			C	70	1	1	0		✓
9	Rms Secondary Voltage Value Phase 1	1	1	32	7		1	0	5	
10	Rms Secondary Voltage Value Phase 2	1	1	52	7		1	0	5	
11	Rms Secondary Voltage Value Phase 3	1	1	72	7		1	0	5	
12	Rms Secondary Current Value Phase 1	1	1	31	7		1	0	5	
13	Rms Secondary Current Value Phase 2	1	1	51	7		1	0	5	
14	Rms Secondary Current Value Phase 3	1	1	71	7		1	0	5	
15	Instantaneous Power Factor	1	1	13	7		1	0	5	
16	Instantaneous Power Factor Phase1	1	1	33	7		1	0	5	
17	Instantaneous Power Factor Phase2	1	1	53	7		1	0	5	
18	Instantaneous Power Factor Phase3	1	1	73	7		1	0	5	
19	Current Frequency	1	1	14	7		1	0	5	
20	Angle_U1I1	1	1	C	52	1	1	0	5	
21	Angle_U2U1	1	1	C	52	4	1	0	5	
22	Angle_U1U3	1	1	C	52	5	1	0	5	
23	Angle_U2I2	1	1	C	52	2	1	0	5	
24	Angle_U3U2	1	1	C	52	6	1	0	5	
25	Angle_U3I3	1	1	C	52	3	1	0	5	

From the configuration sidebar, select **Display, Display and Readout Table** to define the data set to be sent via the Real Time Port.

- Note - The maximum number of quantities that can be selected is 100.

The full Dataset is programmable. Below is an example.

	Label	Data ID	Scaler	Deci	Comments
Real Time Port Dataset programmed **Example**	Serial Number	01	1	0	Current data
	Date	02	1	0	Current data
	Time	03	1	0	Current data
	Non Fatal Alarm	04	1	0	Current data
	Fatal Alarms	05	1	0	Current data
	Import Active Energy	06	10 E 3	0	Current data
	Export Active Energy	07	10 E 3	0	Current data
	Import Reactive Energy	08	10 E 3	0	Current data
	Export Reactive Energy	09	10 E 3	0	Current data
	Import Active Energy Snapshot	10	10 E 3	0	Frozen data at previous End Of Interval
	Export Active Energy Snapshot	11	10 E 3	0	Frozen data at previous End Of Interval
	Reactive Q1 Energy Snapshot	12	10 E 3	0	Frozen data at previous End Of Interval
	Reactive Q2 Energy Snapshot	13	10 E 3	0	Frozen data at previous End Of Interval
	Reactive Q3 Energy Snapshot	14	10 E 3	0	Frozen data at previous End Of Interval
	Reactive Q4 Energy Snapshot	15	10 E 3	0	Frozen data at previous End Of Interval
	Active Import Instantaneous Power	16	10 E 3	0	Current data
	Active Export Instantaneous Power	17	10 E 3	0	Current Data

Other quantities are available, each of them selectable with their OBIS ID or custom ID (alphanumerical), Scaler and Decimal point.
The Dataset sequence is also fully programmable.
Dataset programming can be adapted at any time with our programming tool ACE AIMS Pro, even in the field).

A comprehensive list of data is available including Instantaneous Volts and Amps, Power Factor and Per Phase data.

Easy Implementation of Real-Time Applications in T&D with Actaris ACE SL7000

The communication principle is based on IEC 62056-21 (Ed1.0 2002) protocol, replacing former IEC 61107 (data readout mode):

- The master station initiates a brief handshake on the bus (including the ACE SL7000 address)
- The ACE SL7000 answers back the whole dataset (as programmed in the ACE SL7000)

Communications (handshake included) are always performed at a constant baud rate (as configured into the meter (from 4,800 to 19200 bauds). There is no baud negotiation.

The whole sequence is in ASCII format with for each data line:

- The programmed Data ID (or OBIS code)
- The data field with its unit as programmed (followed by the TimeStamp for Previous EOI data)
- A checksum field is added at the end of the Dataset.

Comms Sequence	Time Scale 19,2 kbps	Data Flow in ASCII Format	Comments
Master Query	0 ms	/ ? 46012065! CR LF	Polls Device at address 46012065
ACESL7000 transmits	20ms	/ ACE Z\ W SL761 CR LF	ACTARIS device answers with meter type ID Z Baud rate (…, 5-9600, 6-19200, ...), W option[1]
Master Query	70ms	ACK 0 Z 0 CR LF	Request for data readout
ACE SL7000 Transmits	120ms

Load Profile Data uploaded seamlessly in the Real-Time Data Acquisition System

The ACE SL7000 stores Previous EOI TimeStamped data, thus allowing to update the load profile of the ACE SL7000 in the master station as soon as the interval is closed.
Previous EOI TimeStamped data are available until the next EOI occurs.
As these EOI TimeStamped data are based on overall registers, any trouble that may occur when an EOI point is missing in the master station can easily be managed with full match with the ACE SL7000 registration.
Load Profile data in the Real-Time acquisition System will also perfectly match with the Load Profile data retrieved by the Remote Billing System.

List of Quantities Available for Real-Time Data Acquisition

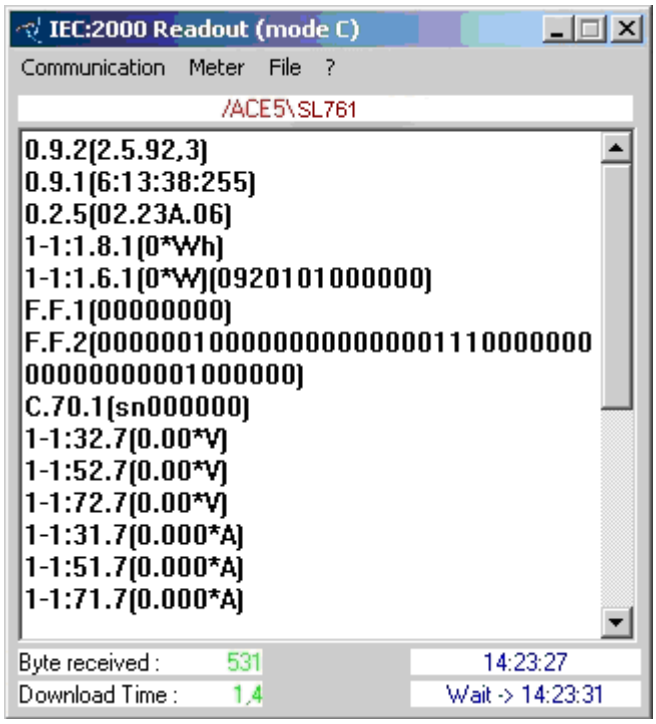
EOI TimeStamped Registers
The following Overall TimeStamped Registers are updated with their timestamp at the End of Interval of Load Profile 1. They are available for acquisition until the next end of interval.

- EOI Import active energy register aggregate
- EOI Import active energy register phase 1
- EOI Import active energy register phase 2
- EOI Import active energy register phase 3
- EOI Export active energy register aggregate
- EOI Export active energy register phase 1
- EOI Export active energy register phase 2
- EOI Export active energy register phase 3
- EOI Import reactive energy register aggregate
- EOI Import reactive energy register phase 1
- EOI Import reactive energy register phase 2
- EOI Import reactive energy register phase 3
- EOI Export reactive energy register aggregate
- EOI Export reactive energy register phase 1
- EOI Export reactive energy register phase 2
- EOI Export reactive energy register phase 3
- EOI Q1 reactive energy register aggregate
- EOI Q1 reactive energy register phase 1
- EOI Q1 reactive energy register phase 2
- EOI Q1 reactive energy register phase 3
- EOI Q2 reactive energy register aggregate
- EOI Q2 reactive energy register phase 1
- EOI Q2 reactive energy register phase 2
- EOI Q2 reactive energy register phase 3
- EOI Q3 reactive energy register aggregate
- EOI Q3 reactive energy register phase 1
- EOI Q3 reactive energy register phase 2
- EOI Q3 reactive energy register phase 3
- EOI Q4 reactive energy register aggregate
- EOI Q4 reactive energy register phase 1
- EOI Q4 reactive energy register phase 2
- EOI Q4 reactive energy register phase 3
- EOI Import apparent energy register aggregate
- EOI Import apparent energy register phase 1
- EOI Import apparent energy register phase 2
- EOI Import apparent energy register phase 3
- EOI Export apparent energy register aggregate
- EOI Export apparent energy register phase 1
- EOI Export apparent energy register phase 2
- EOI Export apparent energy register phase 3

Instantaneous Quantities

52 Energy quantities			19 others
Active	**Reactive**	**Apparent**	**Power factor**
kWh ph 1+	kvarh ph 1+	kVA ph 1+	PF ph1
kWh ph 1-	kvarh ph 1-	kVA ph 1-	PF ph 2
		PF ph 3	
kWh ph 2+	kvarh ph 2+	kVAh ph 2+	
kWh ph 2-	kvarh ph 2-	kVAh ph 2-	PF agg
kWh ph 3+	kvarh ph 3+	kVAh ph 3+	**RMS Values**
kWh ph 3-	kvarh ph 3-	kVAh ph 3-	**Voltages**
			Urms 1
kWh agg+	kvarh agg+	kVAh agg+	Urms 2
kWh agg -	kvarh agg-	kVAh agg-	Urms 3
	kvarh Q1 ph 1	**External**	**Currents**
	kvarh Q2 ph 1	Energy ext 1+	Irms 1
	kvarh Q3 ph 1	Energy ext 1-	Irms 2
	kvarh Q4 ph 1		Irms 3
		Energy ext 2+	
	kvarh Q1 ph 2	Energy ext 2-	Zero sequence
	kvarh Q2 ph 2		Neutral voltage displacement
	kvarh Q3 ph 2	Energy ext 3+	**Zero Sequence**
	kvarh Q4 ph 2	Energy ext 3-	
			Frequency
	kvarh Q1 ph 3	Energy ext. 4+	mains frequency
	kvarh Q2 ph 3	Energy ext. 4-	
	kvarh Q3 ph 3		**Phase angles**
	kvarh Q4 ph 3	**Summation**	Angle U1/I1
		Sum 1	Angle U2/I2
	kvarh Q1 agg	Sum 2	Angle U3/I3
	kvarh Q2 agg	Sum 3	
	kvarh Q3 agg	Sum 4	Angle U1/U2
			Angle U2/U3
			Angle U1/U3

Examples of the Real-Time Data Flow in Raw Format

Data Flow in ASCII Format	Comments
/?!46012065[CR][LF]	Station polls device at address 46012065
/ ACE6\SL761[CR][LF]	ACE SL7000 Acknowledges at 19,600 Baud
ACK060[CR][LF]	Station requests for data readout
STX01(46012065)[CR][LF] 02(1.24.5,1)[CR][LF 03(14:44:23:255)[CR][LF 04(00000000000000000100001100000000000000000)[CR][LF] 05(00000000)[CR][LF] 06(56233*kWh)[CR][LF] 07(34499*kWh)[CR][LF] 08(23455*kVarh)[CR][LF] 09(16312*kVarh)[CR][LF] 10(55002*kWh)(0050124144000)[CR][LF] 11(34499*kWh)(0050124144000)[CR][LF] 12(17964*kVarh)(0050124144000)[CR][LF] 13(5322*kVarh)(0050124144000)[CR][LF] 14(12564*kVarh)(0050124144000)[CR][LF] 15(3693*kVarh)(0050124144000)[CR][LF] 16(3112*kW)[CR][LF] 17(0*kW)![CR][LF]	Start of Text followed by first data (ACE SL7000 address) Current Date Jan 24 2005, Monday Current Time 14h44mn23ss Current Non Fatal Alarms Current Fatal Alarms Current Import Active Register Current Export Active Register Current Import Reactive Register Current Export Reactive Register Previous EOI Import Active Register & TimeStamp Previous EOI Export Active Register & TimeStamp Previous EOI Reactive Q1 Register & TimeStamp Previous EOI Reactive Q2 Register & TimeStamp Previous EOI Reactive Q3 Register & TimeStamp Previous EOI Reactive Q4 Register & TimeStamp Active Import Instantaneous Power Active Export Instantaneous Power
ETX z	End of Text followed by the Checksum Character
	Idle Bus – Message terminated

Variant with OBIS codes