7TMELSQ

IGSS Mitsubishi Melsec Q Series Interface Driver

User's Manual

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CONTENTS:

1 INTRODUCTION

This document describes how to set up and troubleshoot the IGSS 7TMELSQ Interface Driver.

The driver implements the Mitsubishi Melsec Q FORMAT 5 protocol stack.

1.1 SOFTWARE REQUIREMENTS

None (see Hardware Requirements below).

The driver is designed to be used with IGSS version 8.0 and higher.

1.2 HARDWARE REQUIREMENTS

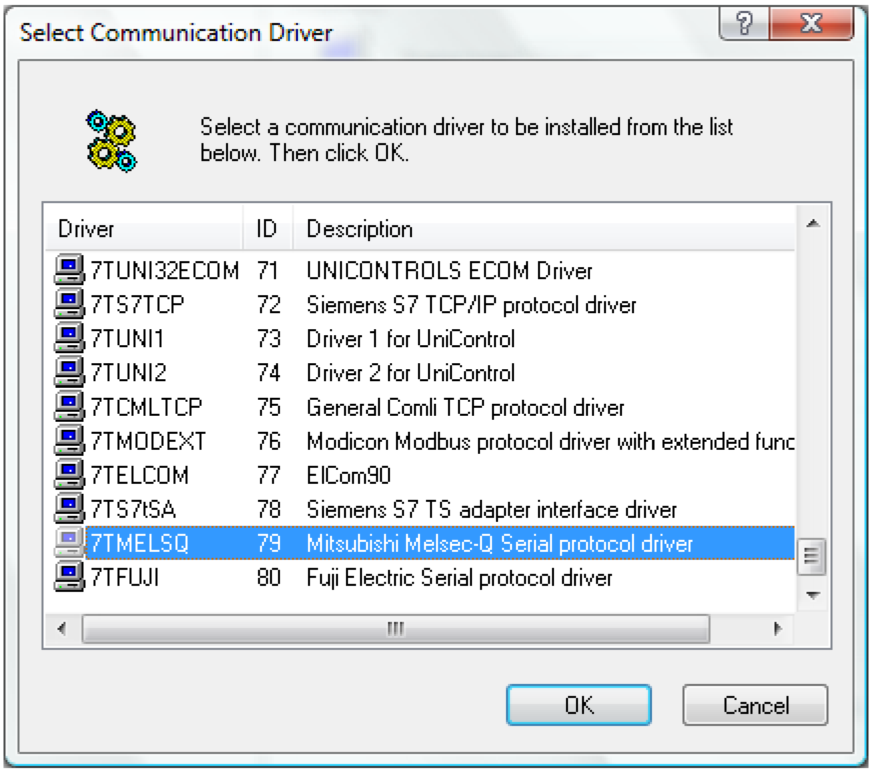
The driver requires one or more RS232 serial interfaces.

The Mitsubishi Q Series PLC's have a number of available interface modules (e.g. the QJ71C24N-R1 or QJ71C24N-R2) for serial communication. At least one serial port is required to be available on the PLC. Please refer to Mitsubishi documentation for cable, setup and wiring instructions.

2 INSTALLATION

2.1 AUTOMATIC INSTALLATION

The driver is normally installed automatically along with the rest of the IGSS system. To verify if the driver has been installed open the System Configuration (sysconfig.exe) and check if a driver with ID:79 is present in the list of available drivers:



Select a communication driver to be installed from the list below. Then click OK.

Driver	ID	Description
7TUNI32ECOM	71	UNICONTROLS ECOM Driver
7TS7TCP	72	Siemens S7 TCP/IP protocol driver
7TUNI1	73	Driver 1 for UniControl
7TUNI2	74	Driver 2 for UniControl
7TCMLTCP	75	General Comli TCP protocol driver
7TMODEXT	76	Modicon Modbus protocol driver with extended func
7TELCOM	77	ElCom90
7TS7tSA	78	Siemens S7 TS adapter interface driver
7TMELSQ	79	Mitsubishi Melsec-Q Serial protocol driver
7TFUJI	80	Fuji Electric Serial protocol driver

If the driver is present then you can proceed to the next section: “Configuring the Driver”, otherwise install the driver using the manual installation procedure described below.

2.2 MANUAL INSTALLATION

Using the following step-by-step guide will install the driver manually on a PC where the IGSS system has already been installed. You need to stop the IGSS system prior to the installation and you need to be logged in with a user account with “Administrator” rights.

Step 1: Verify that the files:

7TMELSQ.DLL
7TMELSQc.DLL
COMMDRV.REG (latest updated version)

exists in the GSS\ directory. If the files doesn’t exists run the IGSSUpdateClient to get the files from the 7T WEB server – or contact 7T Support (support@7t.dk) to get the files via e-mail.

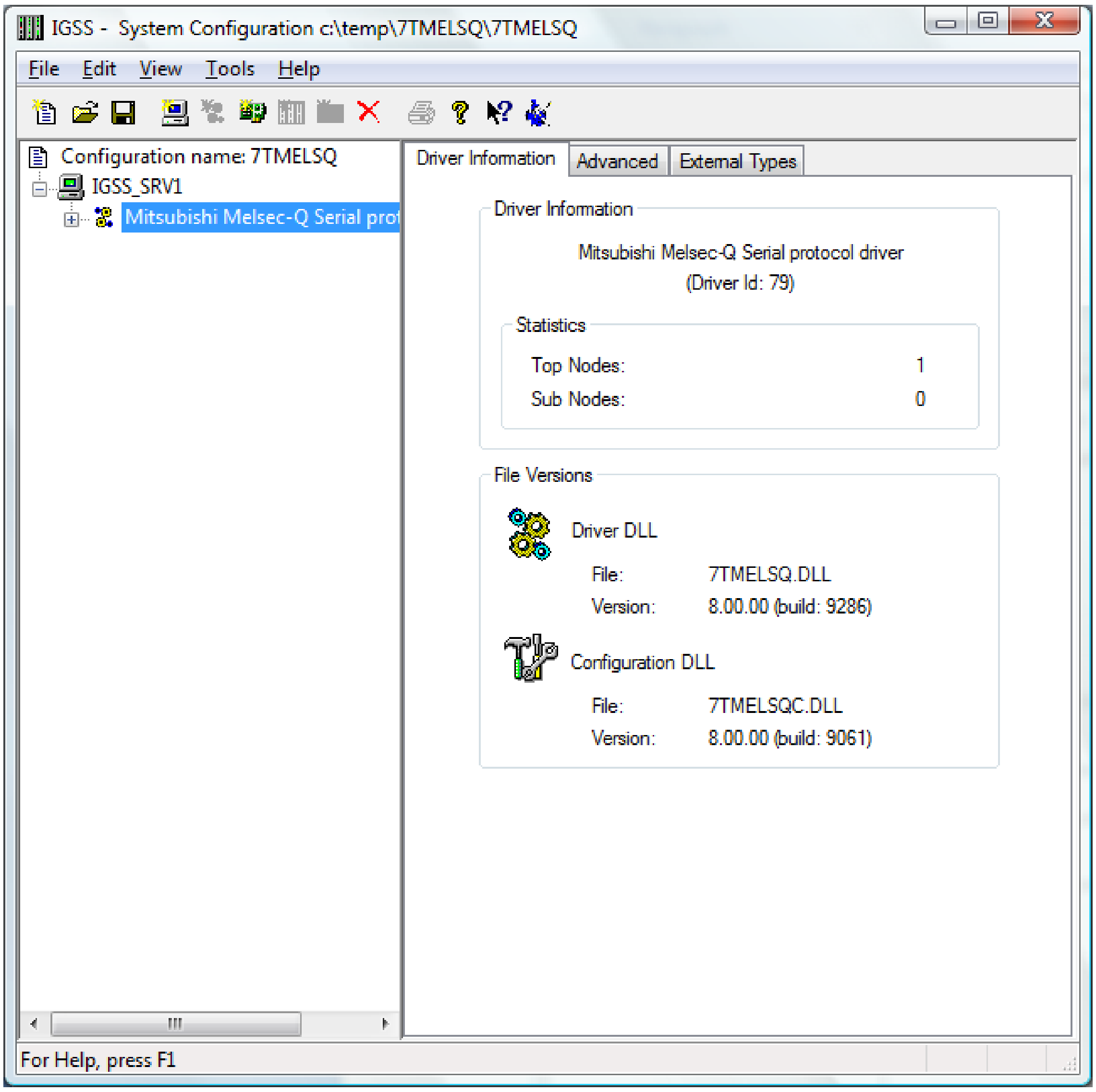
Step 2: Double-click on the COMMDRV.REG file to import the registry settings needed for the system to recognize the driver.

The driver is now installed.

3 CONFIGURING THE DRIVER

This section describes how to configure the driver parameters. All parameters must be configured by using the System Configuration (sysconfig.exe) application. Please note that t**he IGSS system MUST be stopped and restarted** for the configured parameters to take effect.

Start the System Configuration application and add the driver 7TMELSQ (ID:79) to the requested station.


IGSS - System Configuration c:\temp\7TMELSQ\7TMELSQ
File
Edit
View
Tools
Help
Configuration name: 7TMELSQ
IGSS_SRV1
Mitsubishi Melsec-Q Serial prot
Driver Information
Advanced
External Types
For Help, press F1

Driver Information

Mitsubishi Melsec-Q Serial protocol driver
(Driver Id: 79)

Statistics

Top Nodes:	1
Sub Nodes:	0

File Versions

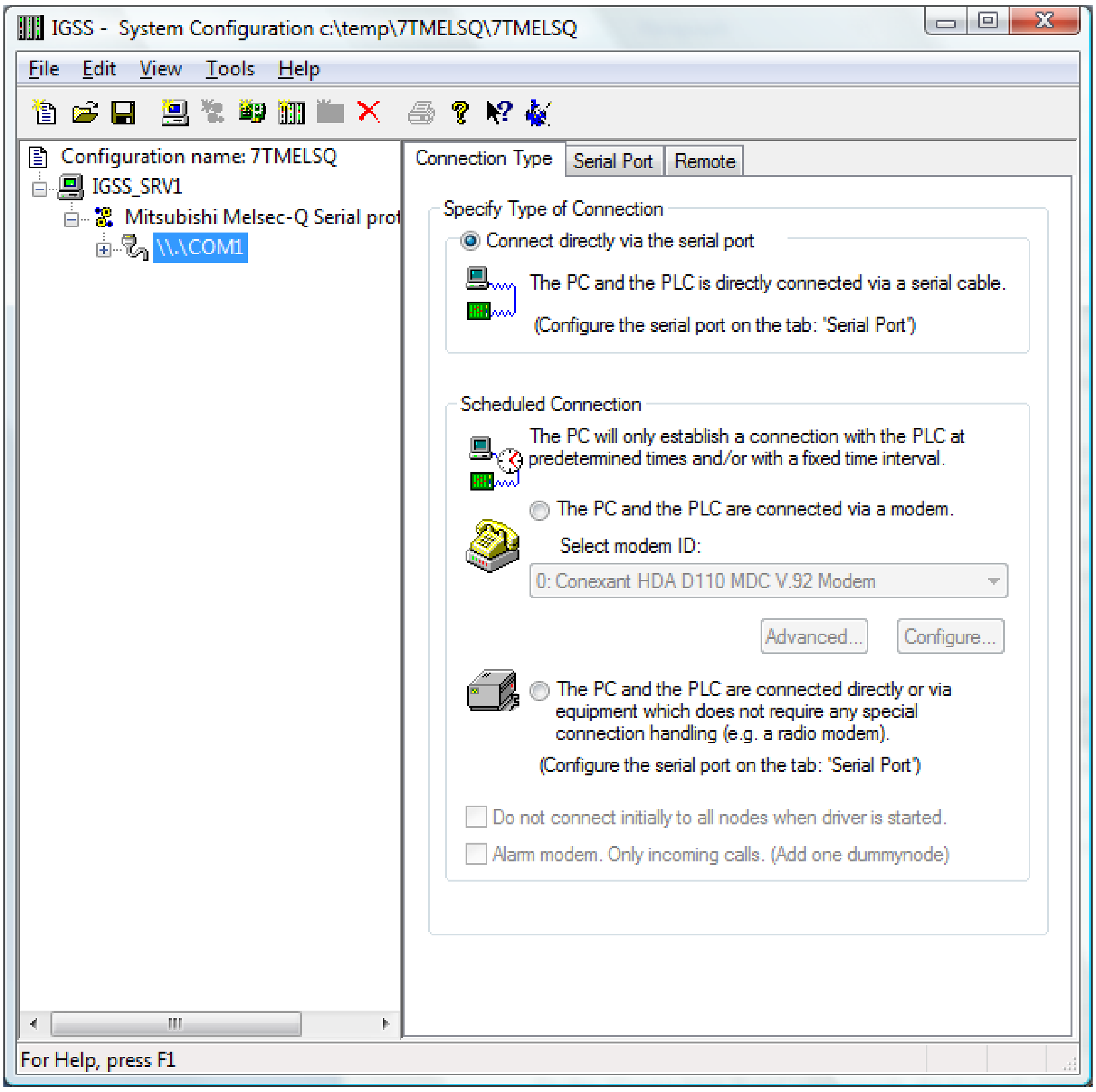
Driver DLL

File:	7TMELSQ.DLL
Version:	8.00.00 (build: 9286)

Configuration DLL

File:	7TMELSQC.DLL
Version:	8.00.00 (build: 9061)

Once the driver has been added to the relevant station then you are ready to proceed with adding PLC nodes. This is done by right-clicking on the driver and select “New Interface” menu point.


IGSS - System Configuration c:\temp\7TMELSQ\7TMELSQ

File Edit View Tools Help

Configuration name: 7TMELSQ
IGSS_SRV1
Mitsubishi Melsec-Q Serial prot
\\.\COM1

Connection Type | Serial Port | Remote

Specify Type of Connection

[✓ Connect directly via the serial port]

The PC and the PLC is directly connected via a serial cable.

(Configure the serial port on the tab: 'Serial Port')

Scheduled Connection

The PC will only establish a connection with the PLC at predetermined times and/or with a fixed time interval.

The PC and the PLC are connected via a modem.

Select modem ID: 0: Conexant HDA D110 MDC V.92 Modem

Advanced... Configure...

The PC and the PLC are connected directly or via equipment which does not require any special connection handling (e.g. a radio modem).

(Configure the serial port on the tab: 'Serial Port')

Do not connect initially to all nodes when driver is started.

Alarm modem. Only incoming calls. (Add one dummynode)

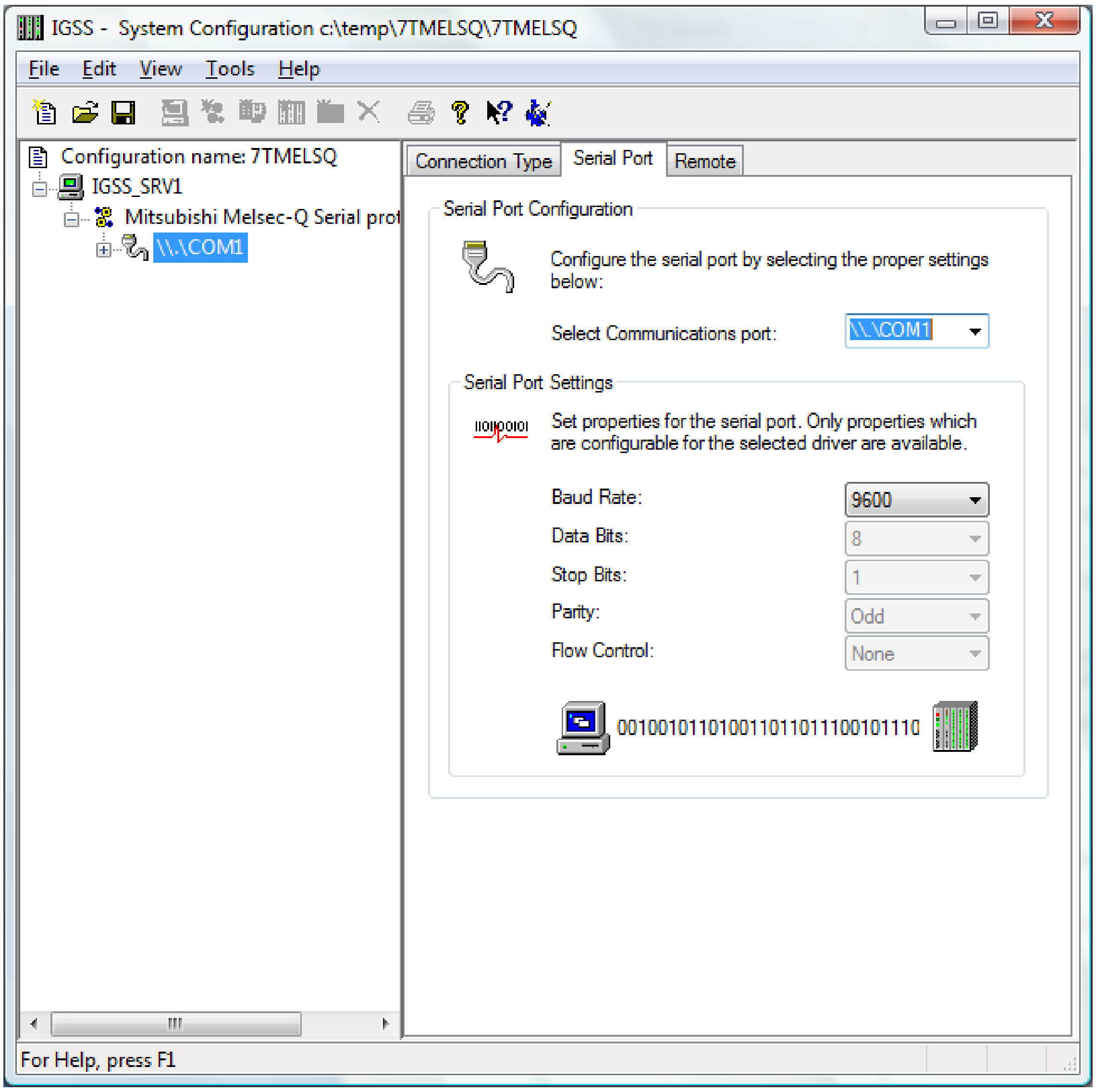
For Help, press F1

On the “Connection Type” you specify the type of connection:

- Direct connection
- Modem Connection
- Other connection (e.g. Radio Connection)

The Mitsubishi Melsec Q interface driver is designed for “Direct Connection”, so you should select the “Connect directly via the serial port” option.

Switch to the “Serial Port” pane:


IGSS - System Configuration c:\temp\7TMELSQ\7TMELSQ
File Edit View Tools Help
Configuration name: 7TMELSQ
IGSS_SRV1
Mitsubishi Melsec-Q Serial prot
\\.\COM1
Connection Type
Serial Port
Remote
Serial Port Configuration
Serial Port Settings
0010010110100110110111001011110
For Help, press F1

Configure the serial port by selecting the proper settings below:

Select Communications port: \\.\COM1

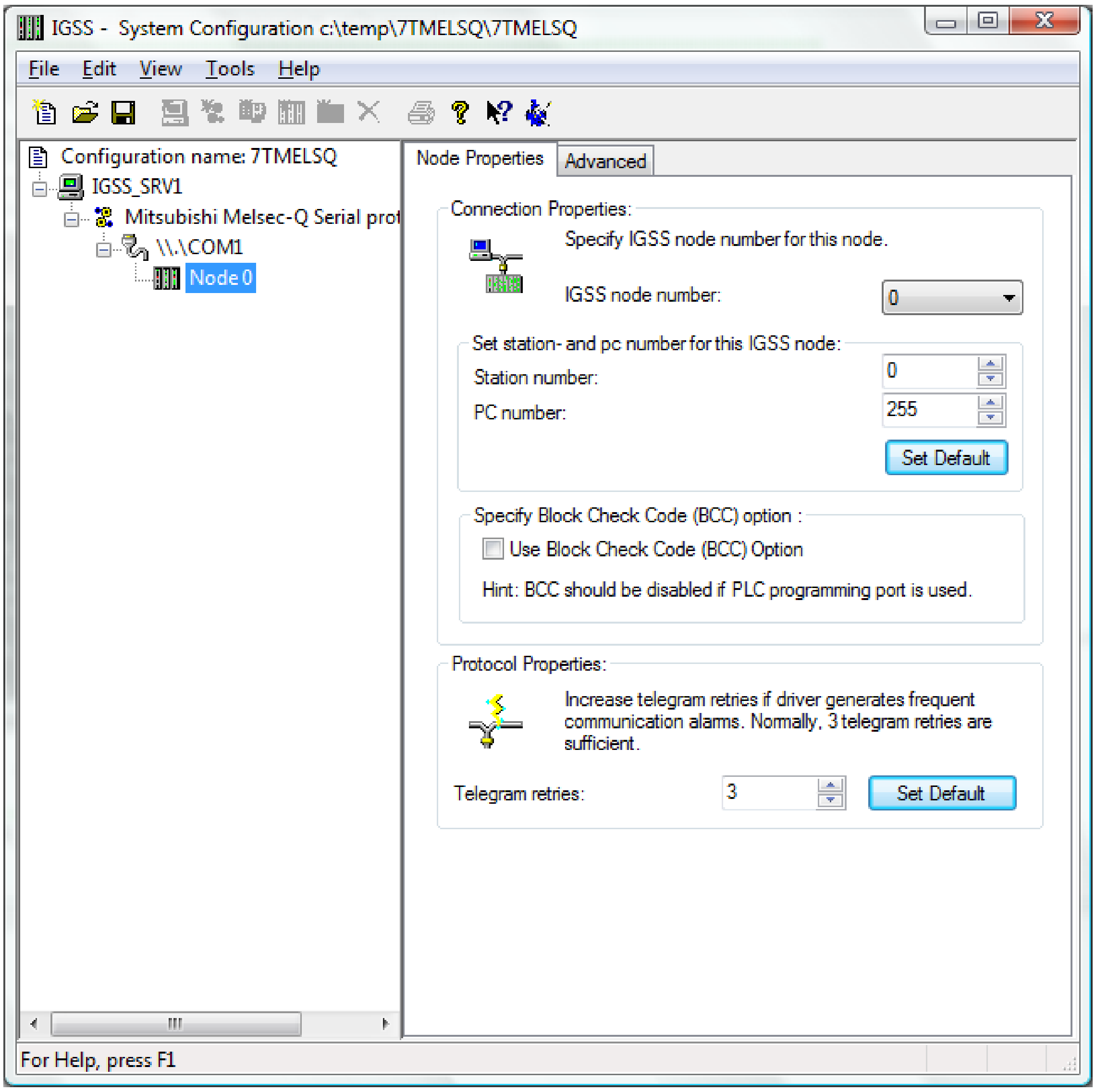
Set properties for the serial port. Only properties which are configurable for the selected driver are available.

Baud Rate: 9600
Data Bits: 8
Stop Bits: 1
Parity: Odd
Flow Control: None

Since the Mitsubishi Melsec Q protocol is designed for point-to-point communication you need one serial port for each PLC you connect to. The IGSS Mitsubishi Melsec Q driver supports up to 8 serial ports (8 PLC connections).

Each port must be configured with Serial port ID (e.g. \\.\COM1:) and serial port parameters. Default serial parameters are 9600 Baud, 8 data bits, 1 stop bit and odd parity. These parameters are also default for the communication port of the Mitsubishi Melsec Q series PLCs.

Add a node by right clicking the channel in the left side tree-view and select the “New Node” menu when the pop-up appears:


IGSS - System Configuration c:\temp\7TMELSQ\7TMELSQ
File Edit View Tools Help
Configuration name: 7TMELSQ
IGSS_SRV1
Mitsubishi Melsec-Q Serial prot
\\.\COM1
Node 0
Node Properties
Advanced
Set Default
Set Default
For Help, press F1

Connection Properties:

Specify IGSS node number for this node.

IGSS node number: 0

Set station- and pc number for this IGSS node:

Station number: 0

PC number: 255

Specify Block Check Code (BCC) option :

☐ Use Block Check Code (BCC) Option

Hint: BCC should be disabled if PLC programming port is used.

Protocol Properties:

Increase telegram retries if driver generates frequent communication alarms. Normally, 3 telegram retries are sufficient.

Telegram retries: 3

Each PLC node requires a few fundamental parameters:

IGSS node number: This is the node number which IGSS uses to reference a unique PLC. This node number is required when binding and IGSS atom (tag) to a register in the PLC. Any number from the drop down list can be used.

Station number: The station number designates the number set on the Q series C24 module. This number is normally 0 (zero) but can be set using the GX Developer software from Mitsubishi. If you have more Mitsubishi Melsec Q stations in a multi-drop configuration each station must be designated with a separate unique station number.

PC number: The PC number is only used when routing is required. The driver currently doesn’t support routing and thus the PC number should always be set to 255 (default). If your application requires routing please contact 7T technical support for guidelines.

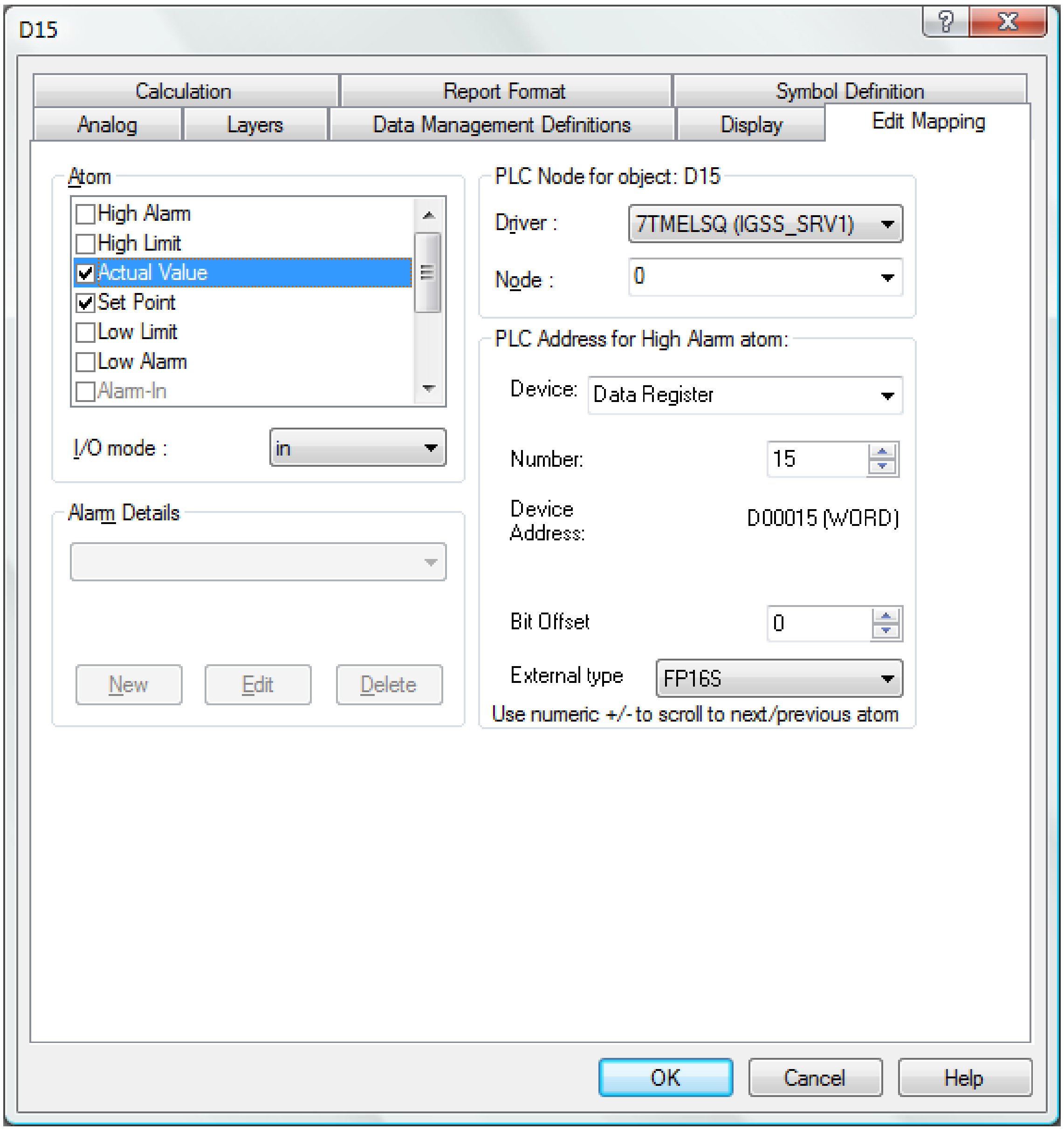
Use Block Check Code: This option is use to set if the driver should expect and check a Block Check Code (BCC) at the end of each telegram. Normally this option should be checked (BCC enabled) but if you are using the programming port on the PLC (instead of a communication board) then you should uncheck this option and thus instruct the driver to disregard BCC.

Telegram retries: Here you can specify the number of telegram reties the driver should use before issuing a communication fault. The default value is 3 which suit most applications. If you experience frequent communication faults you might try to increase this parameter.

4 CONFIGURING THE OBJECTS

Once the driver and the PLC nodes have been defined, IGSS Objects and Atoms can be linked to process variable in the PLC. Various different types of PLC memory can be accessed for read/write operations using the driver.

By using the “Edit Mapping” tab in the object properties dialog you can specify the binding between the object’s atoms and the PLC process variables. Start by selecting an atom and select the 7TMELSQ driver in the “Driver” drop down list:



Now select the desired PLC node number and continue by setting be desired Device. Then specify the number (register number within the device type). Note that the corresponding Mnemonic is displayed and updated as you select the appropriate parameters. This is a help to make sure you always bind to the correct process variable.

Continue this process for each atom on the object and save the parameters by clicking the OK button when finished.

4.1 SUPPORTED MEMORY TYPES

The driver supports a number of different device types in the PLC:

16-Bit types:

Device type	Valid Range		Read/Write
	Q02(H), Q06, Q12H, Q25, Q12PH, Q25PH, Q2A, Q2A-S1, Q2AS, Q2AS-S1, Q2ASH, Q2ASH – S1, Q3A, Q4A, Q4AR	**Q00J, Q00, Q01**	
Data Register	D00000-D12287	D00000-D11135	R/W
Spec. Data Register	DS00000-DS02047	DS00000-DS01023	R/W
Link Register	W0000-W1FFF (hex)	W0000-W07FF (hex)	R/W
Spec. Link Register	SW0000-SW07FF (hex)	SW0000-SW03FF (hex)	R/W
File Register	R00000-R32767	R00000-R32767	R/W
Index Register	Z00-Z15	Z0-Z9	R/W
Timer Value	TN000-TN2047	TN000-TN0511	R/W
Counter Value	CN000-CN2047	CN000-CN0511	R/W
Retentive Timer Value	SN000-SN2047	SN000-SN0511	R/W

1-Bit (Boolean) types:

Device type	Valid Range		Read/Write
	Q02(H), Q06, Q12H, Q25, Q12PH, Q25PH, Q2A, Q2A-S1, Q2AS, Q2AS-S1, Q2ASH, Q2ASH – S1, Q3A, Q4A, Q4AR	**Q00J, Q00, Q01**	
Input Relay	X0000-X1FFF (hex)	X0000-X07FF (hex)	R
Direct Input	DX0000-DX1FFF (hex)	DX0000-DX07FF (hex)	R
Output Relay	Y0000-Y1FFF (hex)	Y0000-Y07FF (hex)	R/W
Direct Output	DY0000-DY1FFF (hex)	DY0000-DY07FF (hex)	R/W
Internal Relay	M00000-M08191	M00000-M08191	R/W
Latch Relay	L00000-L08191	L00000-L02047	R/W
Annunciator	F00000-F02047	F00000-F01023	R/W
Edge Relay	V00000-V02047	V00000-V01023	R/W
Link Relay	B0000-B1FFF (hex)	B0000-B07FF (hex)	R/W
Timer Contact	TS000-TS2047	TS000-TS0511	R/W
Timer Coil	TC000-TC2047	TC000-TC0511	R/W
Counter Contact	CS000-CS2047	CS000-CS0511	R/W
Counter Coil	CC000-CC2047	CC000-CC0511	R/W
Retentive Timer Contact	SS000-SS2047	SS000-SS0511	R/W
Retentive Timer Coil	SC000-SC2047	SC000-SC0511	R/W
Spec. Link Relay	SB0000-SB07FF (hex)	SB0000-SB03FF (hex)	R/W
Step Relay	S00000-S08191	S00000-S02047	R/W

These addressing methods allow you to bind to any type of process value in the PLC.

Please note that if you want to bind to a 32 bit (DWORD) value then use word addressing and specify the external type as one of the supported 32 bit types, then the system will automatically do the correct addressing.

If you e.g. want to bind to a floating point process value at D0254 you should specify: D0254 and select the external type FLOAT. Then the Driver will automatically fetch both D0254 and D0255 and interpret the content as a floating point (IEEE float) value.

Please note that all bit types (Input Relay, Output Relay etc.) are *only* one bit values when written as a command to the PLC. I.e. if you bind a digital command to Y012 and send the command "->1" then *only* Output Relay 012 is written. This means that you can't send complex commands that require more than one bit to be set/reset.

The driver automatically fetches at least 16 bits when a specific bit is referenced. If you e.g. define a digital object which mimics the state of 3 Relays combined (e.g. Y005, Y007 and Y013) then the driver automatically fetches the range Y000 -> Y015 to ensure that all bits are read from the PLC.

IT IS HIGHLY RECOMMENTED to use Data Register as the primary memory type for exchanging variable information between IGSS and the PLC. Read- and especially write operations directly to Output, Timers and Counters cannot be verified by the PLC program and might thus lead to hazards.

5 PERFORMANCE AND THROUGHPUT

The driver is designed for maximum throughput on any given serial link. On a standard PC with a 9600 baud serial port (or comparable) you should expect a throughput of 8+ request/response cycles pr. second. Each PLC node is handled concurrent and independently. This means that if you add more PLC's to the system then the throughput pr. PLC should only be affected marginally provided that the PC throughput is sufficient.

IMPORTANT NOTICE: The IGSS communication engine optimizes communication throughput by seeking to group data whenever possible. This means that if the communication engine is required to read e.g. D0001 and D0031 then it will read data registers D0001, D0002, … , D0031 as a block. This is much more efficient than reading the two data registers using two separate read requests.

6 ERROR CODES

This section describes the error codes specific to the IGSS 7TMELSQ interface driver.

While troubleshooting communication- or addressing problems the Driver Test Application might be useful to display error codes reported by the driver.

0x4F01: _7TMELSQ_NODEINFO_MISSING
Cause: The driver failed to look up information (Station number, Network number etc.) for a specific PLC node.

Action: Check that all nodes are properly defined and that all nodes are configured on the correct channels (e.g. COM1:). Subcode contains the node number which do not have any proper node information.

0x4F02: _7TMELSQ_RESP_TOO_SHORT
Cause: The driver received a response telegram from a PLC which is too short to be a valid telegram.

Action: Please check hardware and cables. Check baudrate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cabels and converters. Check that all ground signals are wired correctly. Subcode contains the actual length of the telegram

0x4F03: _7TMELSQ_INVALID_DATA_REGISTER_TYPE
Cause: The driver was requested to read or write an unsupported data type.

Action: Check that all configured addresses are valid. Use the driver test application (T7T) to identify the data block code for the offending request.

0x4F04: _7TMELSQ_INVALID_MESSAGE_TYPE
Cause: The driver was requested to read or write an unsupported message type type.

Action: Contact 7T support.

0x4F05: _7TMELSQ_IO_WRITE_ERROR_LEN
Cause: The driver is unable to write data to the serial port.

Action: Please check hardware and cables.

0x4F06: _7TMELSQ_IO_READ_TIMEOUT
Cause: The driver is unable to receive any data on the serial link.

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters.

0x4F07: _7TMELSQ_COM_READ_ERROR
Cause: An error has occured while reading from the serial (COM) port.

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters. Check that all ground signals are wired correctly. Subcode contains the actual error code from Windows serial driver.

0x4F08: _7TMELSQ_IO_BCC_ERROR
Cause: Driver received a telegram with an incorrect block check code

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters. Check that all ground signals are wired correctly.

0x4F09: _7TMELSQ_IO_INCORRECT_FRAMING
Cause: Driver received a telegram with an incorrect block check code

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters. Check that all ground signals are wired correctly.

0x4F0A: _7TMELSQ_TOO_FEW_RESP_DATA
Cause: The driver received a response telegram from a PLC which has too few actual data compared to the expected amount of data.

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters. Check that all ground signals are wired correctly. Subcode contains the actual length of the telegram.

0x4F0B: _7TMELSQ_UNEXP_RESP_HEADER
Cause: The driver received a response telegram from a PLC which had an unexpected header.

Action: Please check hardware and cables. Check baud rate, data bits, parity etc. These should normally be 9600,ODD,8,1 or 19200,ODD,8,1. Hardware flow control might be needed depending on cables and converters. Check that all ground signals are wired correctly.

0x4F0C: _7TMELSQ_PLC_ERROR_RESP
Cause: The driver received a response telegram from a PLC with an error code

Action: Please check that all addresses are correct and valid. Check that all cables and communication modules are OK. Subcode contains the error code received from the PLC. Please check the Mitsubishi documentation for exact interpretation.

#0x4F0D: _7TMELSQ_DATA_BLOCK_TOO_BIG
Cause: The driver was requested to read/write a block bigger than 32 data words.

Action: Check that driver segment length is less or equal to 32 data words.