7TACOM

IGSS FLYGT AquaCom Interface Driver

User's Manual

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CONTENTS:

1 INTRODUCTION

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

1.1 SOFTWARE REQUIREMENTS

None (see Hardware Requirements below).

The driver is designed to be used with IGSS version 7.0 and higher.

1.2 HARDWARE REQUIREMENTS

The interface driver requires at least one serial port (RS232) or modem device to communicate with FLYGT substations.

1.3 SUPPORTED HARDWARE

The interface driver is designed to support all Flygt sub stations which use the FLYGT AquaCom communication protocol (e.g. the FGC 323).

1.4 PREREQUISITES

In order to determine which values are available in the Flygt substations it is paramount to have an .ATF file which describes the substation content and capabilities. This file is available from the substation vendor.

1.5 SUPPORTED FUNCTIONS

The interface driver is designed to support the following AquaCom functions as described in the document: AquaCom – RTU level Rev 1.6 (2004).

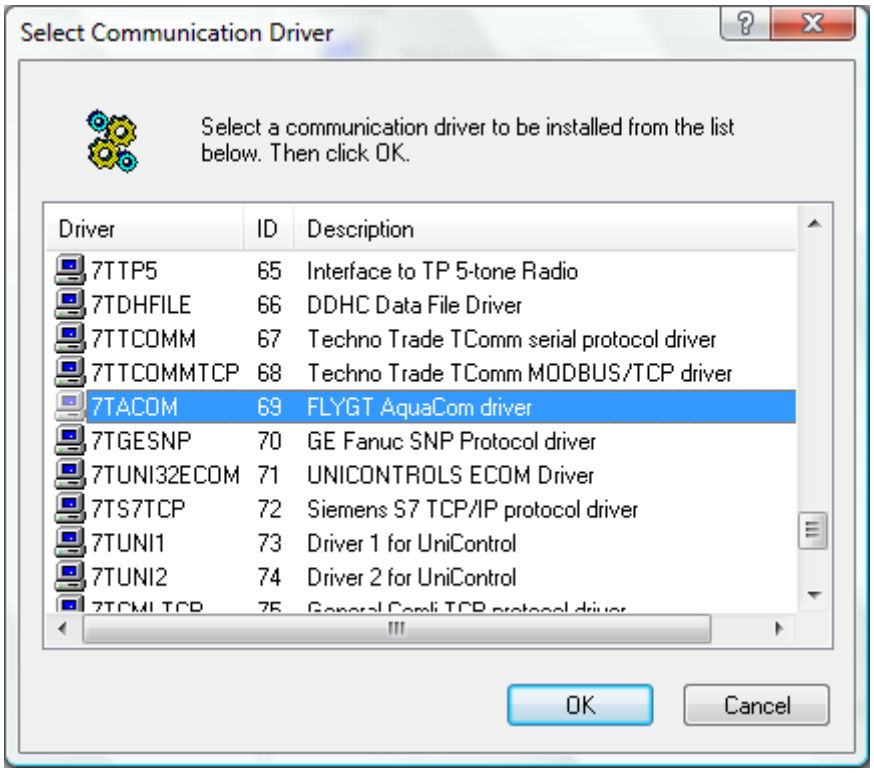
- WGS: Fetch status values from the substation (read only)
- WGD: Fetch report values from the substation (read only)
- MCC: Fetch and write set point values to/from the substation (read/write)
- WGH: Fetch historical data from the substation (read only)
- WCA: Fetch alarm status from the substation (read only)
- MCC: Implement Machine Control (write only)

All other AquaCom functions are *not* supported by the interface driver.

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:69 are present in the list of available drivers:



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:

7TACOM.DLL
7TACOMc.DLL
COMMDRV.REG (latest updated version)

Exists in the GSS\ directory. If the files don’t exist 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.

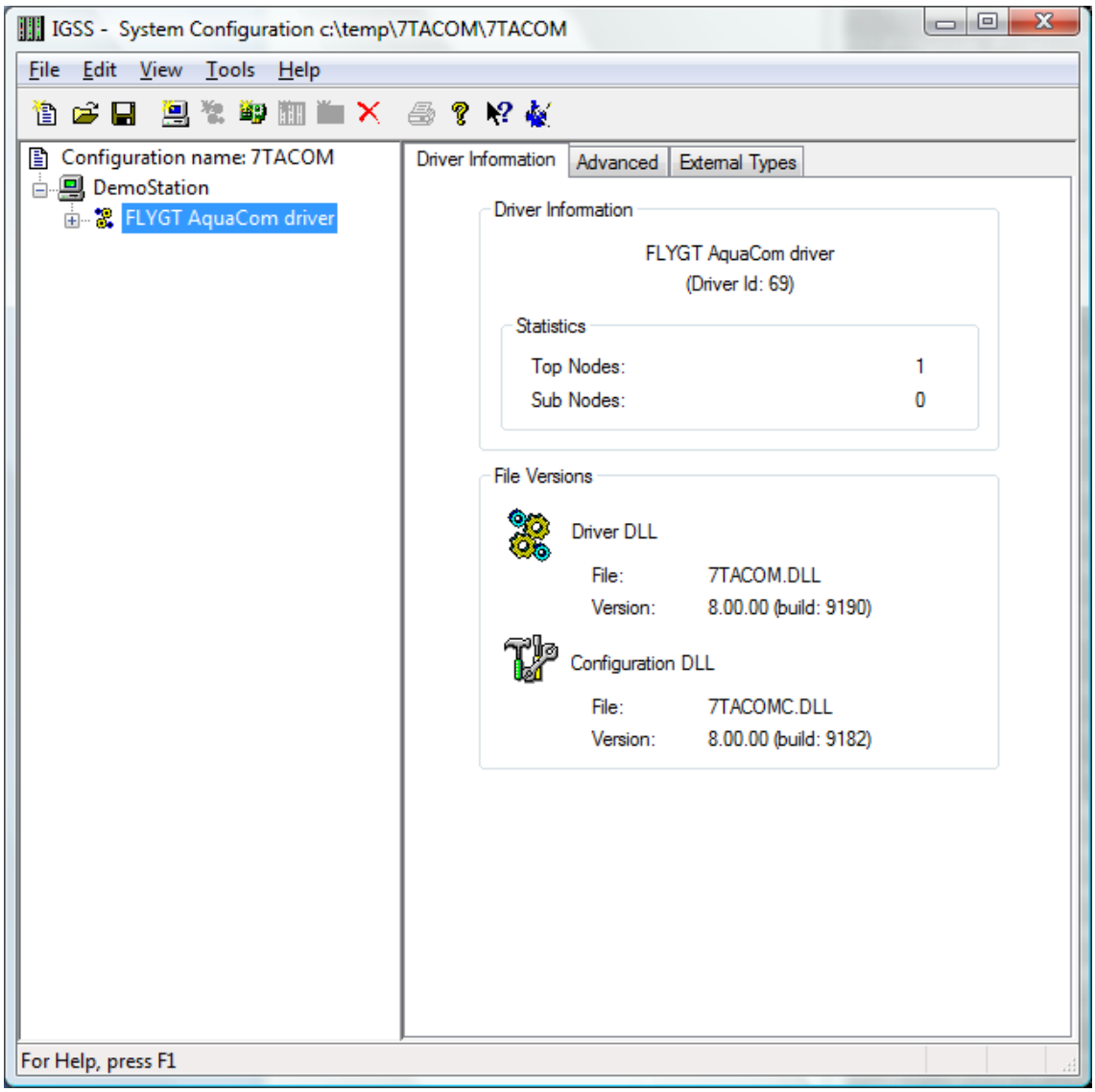
Step 2: Double-click on the COMMDRV.REG file to import the registry settings needed for the system to recognize the driver.

The driver is now installed.

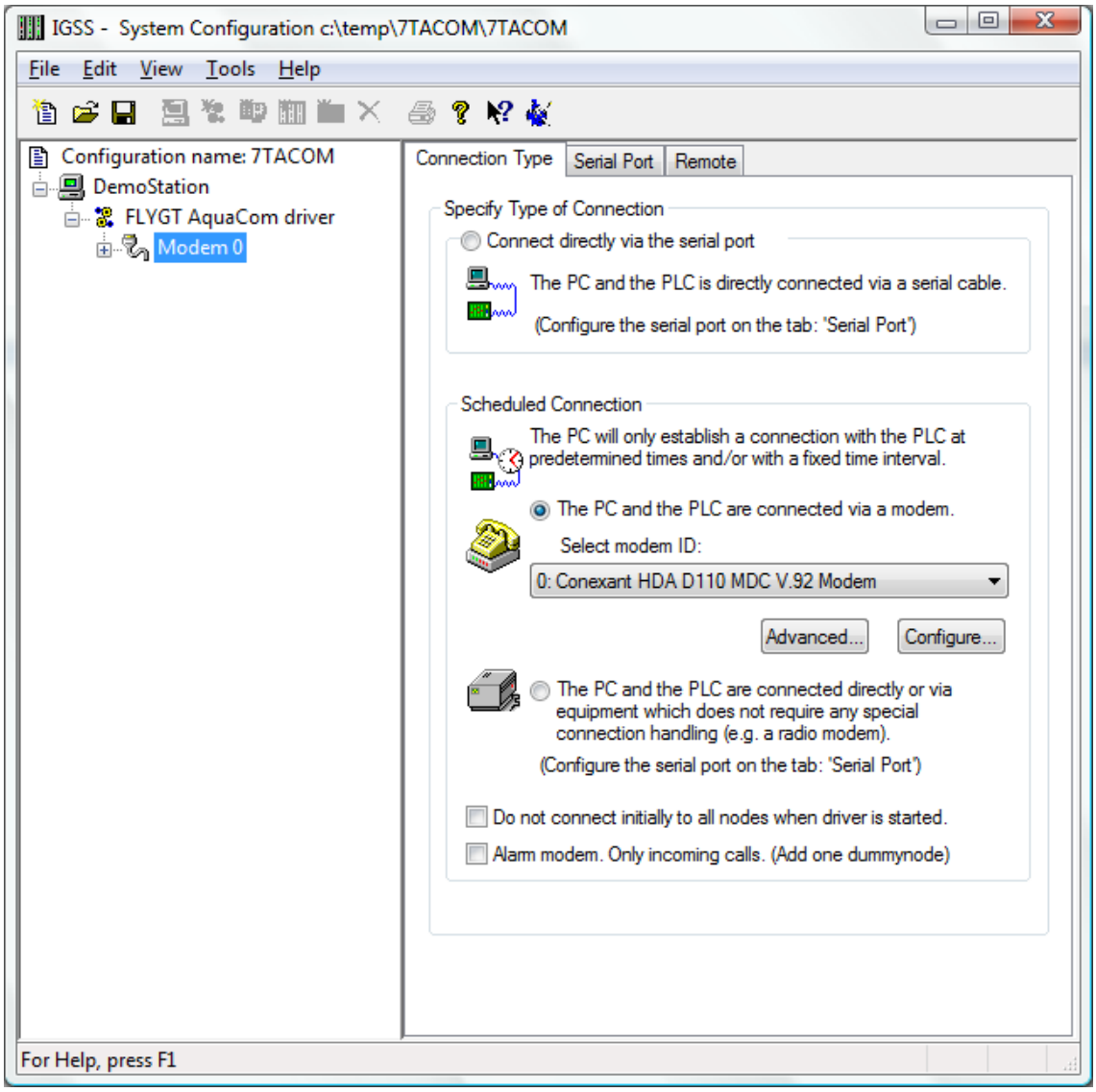
3 CONFIGURING THE DRIVER

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 7TACOM (ID:69) to the requested station.



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.



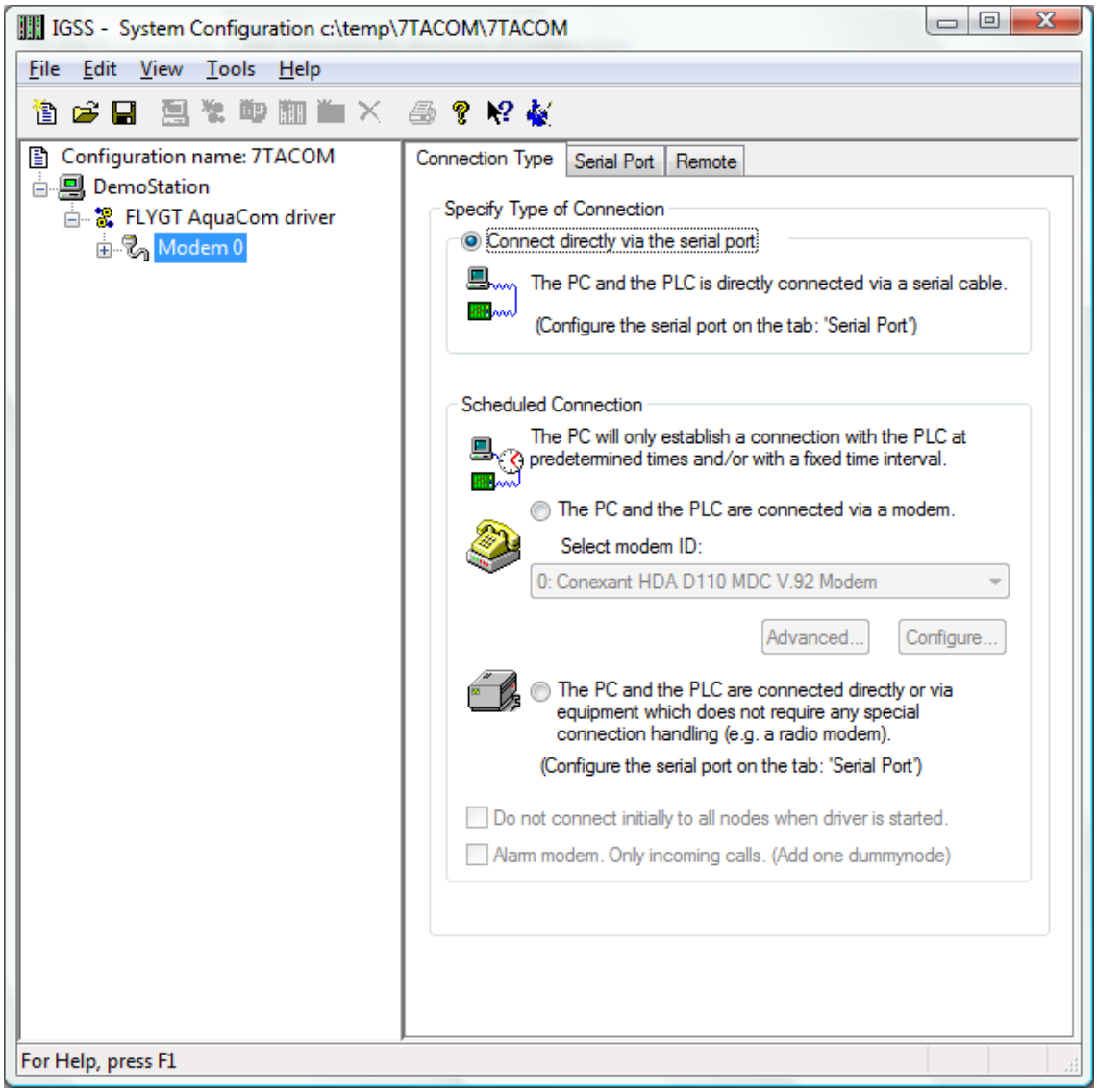
On the “Connection Type” you specify the type of connection:

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

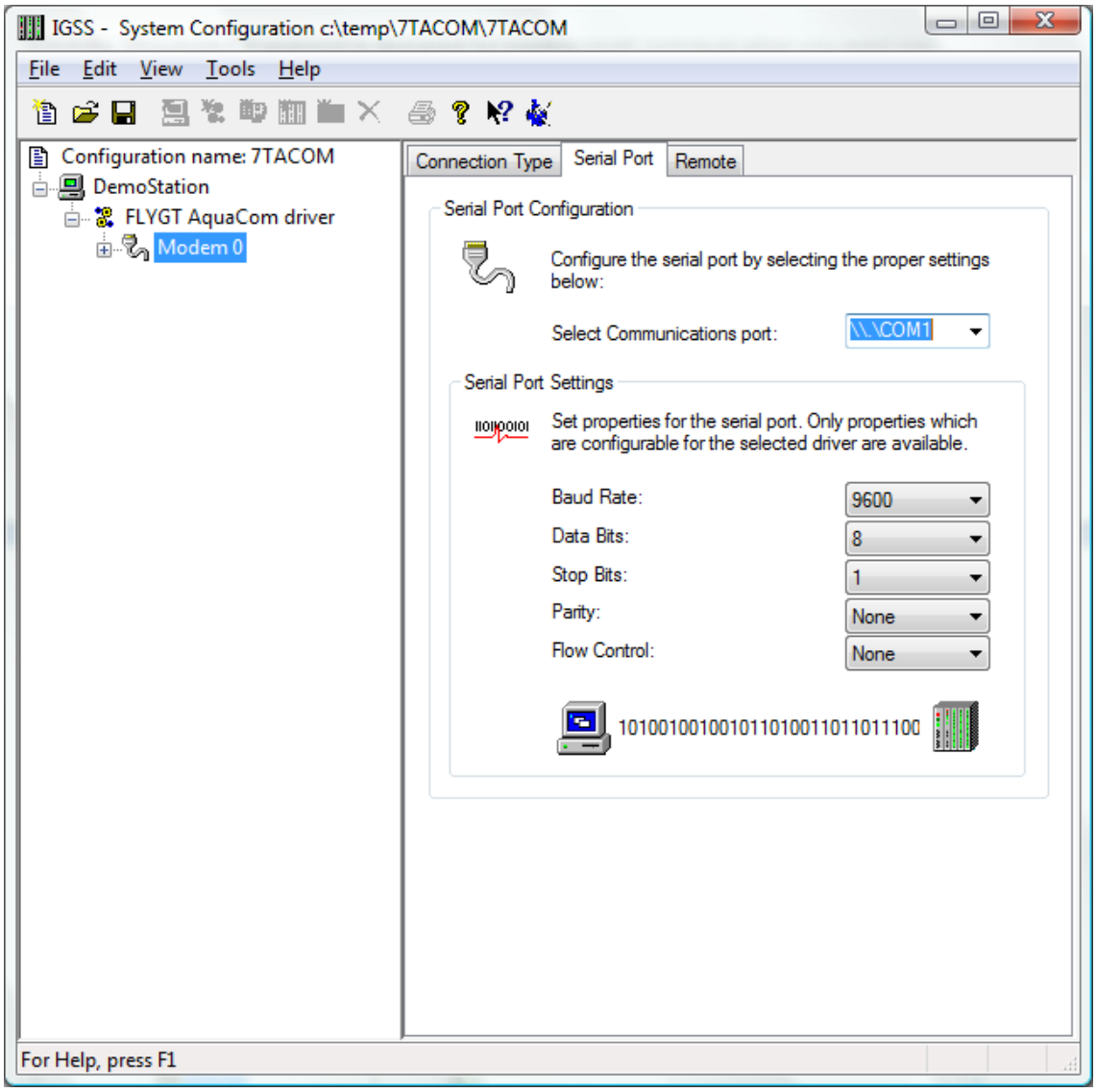
The Flygt AquaCom interface driver is designed to use all three connection types. The following section describes what needs to be set up for each connection type.

3.1 DIRECT CONNECTION

If the substation is connected directly to the PC using a serial RS232 cable (null-modem) or multi-drop configuration you should select the option “Connect directly via the serial port”:



Now proceed to the “Serial Port” pane and set up the serial port communication parameters:



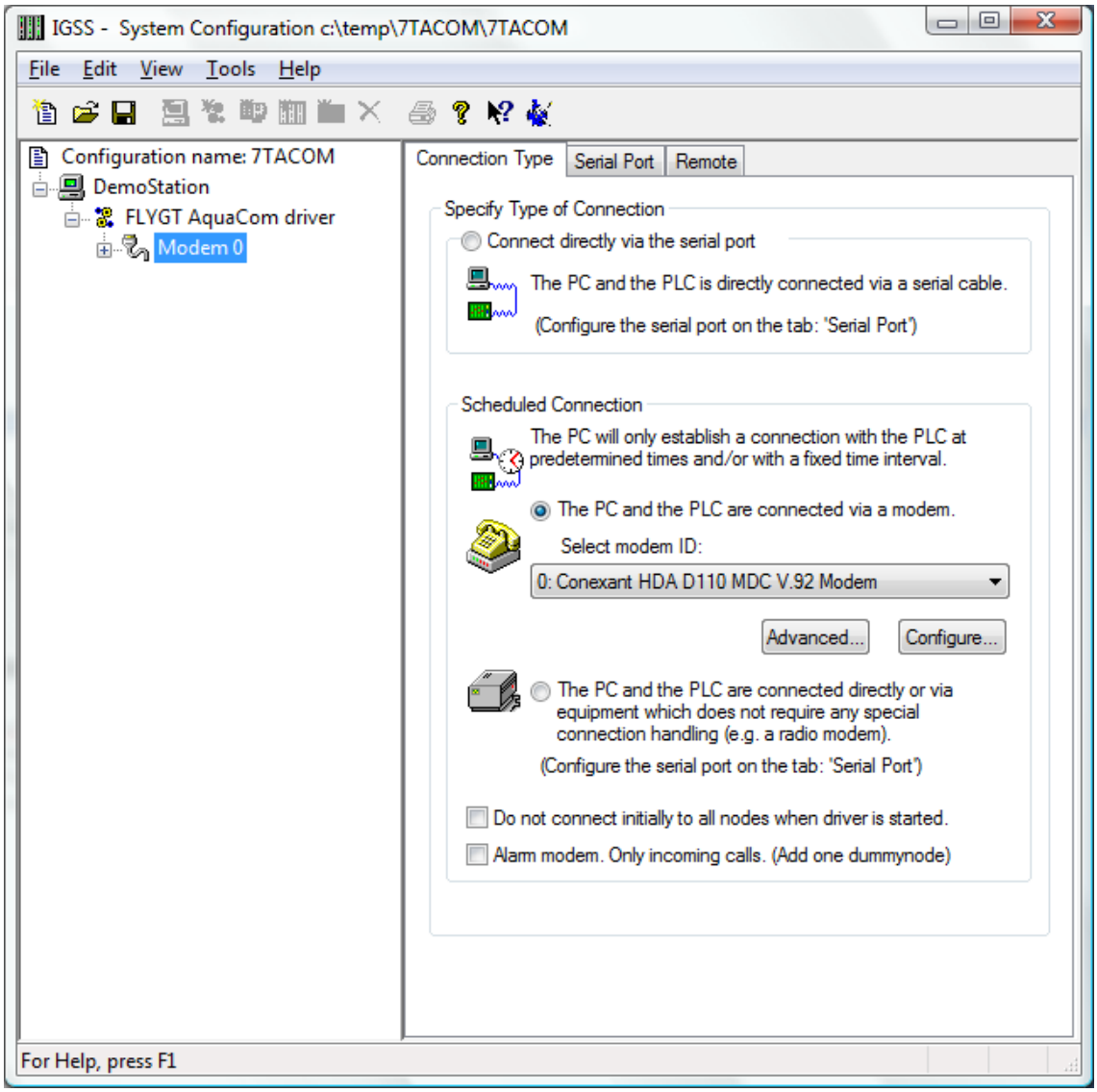
The Flygt AquaCom interface driver supports up to 8 serial ports in point-to-point or multi drop configurations. For each port you must specify the communication parameters individually:

Each port must be configured with Serial port ID (e.g. \\.\COM3:) and serial port parameters. Default serial parameters are 9600 Baud, 8 data bits, 1 stop bit and no parity. These parameters must correspond with the parameters which you have set up in the sub stations.

Now continue setting up the substation parameters as described in section 3.4.

3.2 MODEM CONNECTION

The Flygt AquaCom interface driver supports using a dialled-up connection (PSTN or GSM). In this case the PC and each substation must be equipped with a suitable PSTN or GSM modem. To configure one or more modem connections you must select the option: “The PC and the PLC are connected via a modem”:



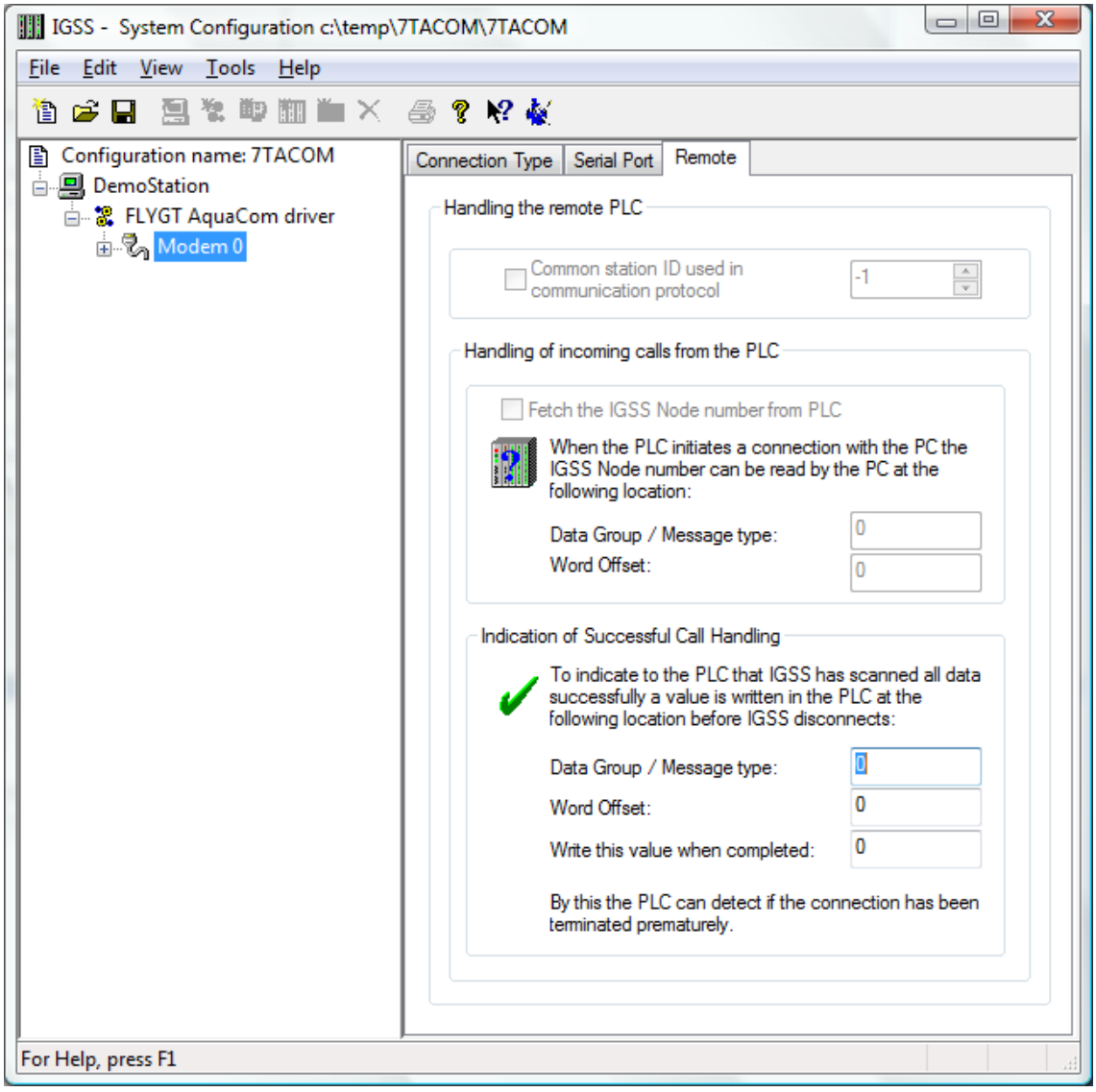
Select the modem you want to use for the connection (in this case Conexant HDA D110 MDC V.92 Modem) and continue to set up modem specific parameters by pressing the “Configure…” button. The options available in the “Configure” popup dialog differs among modem vendors but typically baud rate, flow control, additional AT modem commands, compression and other hardware parameters can be set up using the “Configure…” dialog.

Technical note: The Flygt AquaCom interface uses Windows Telephone API (TAPI) which is a standard component of the Windows OS system. Please make sure that you system has all latest updates for TAPI installed.

Advice: Before deploying the Flygt AquaCom interface it is advised that you test your modem connections manually using a terminal program to make sure you have compatible modems and to verify that the modem commands that TAPI is using by default works with your modem.

Once you have set up the modem continue to the “Remote Pane”.

The Flygt AquaCom interface driver doesn’t make use of any of the parameters which you can set up through this dialog so just make sure it looks like this:



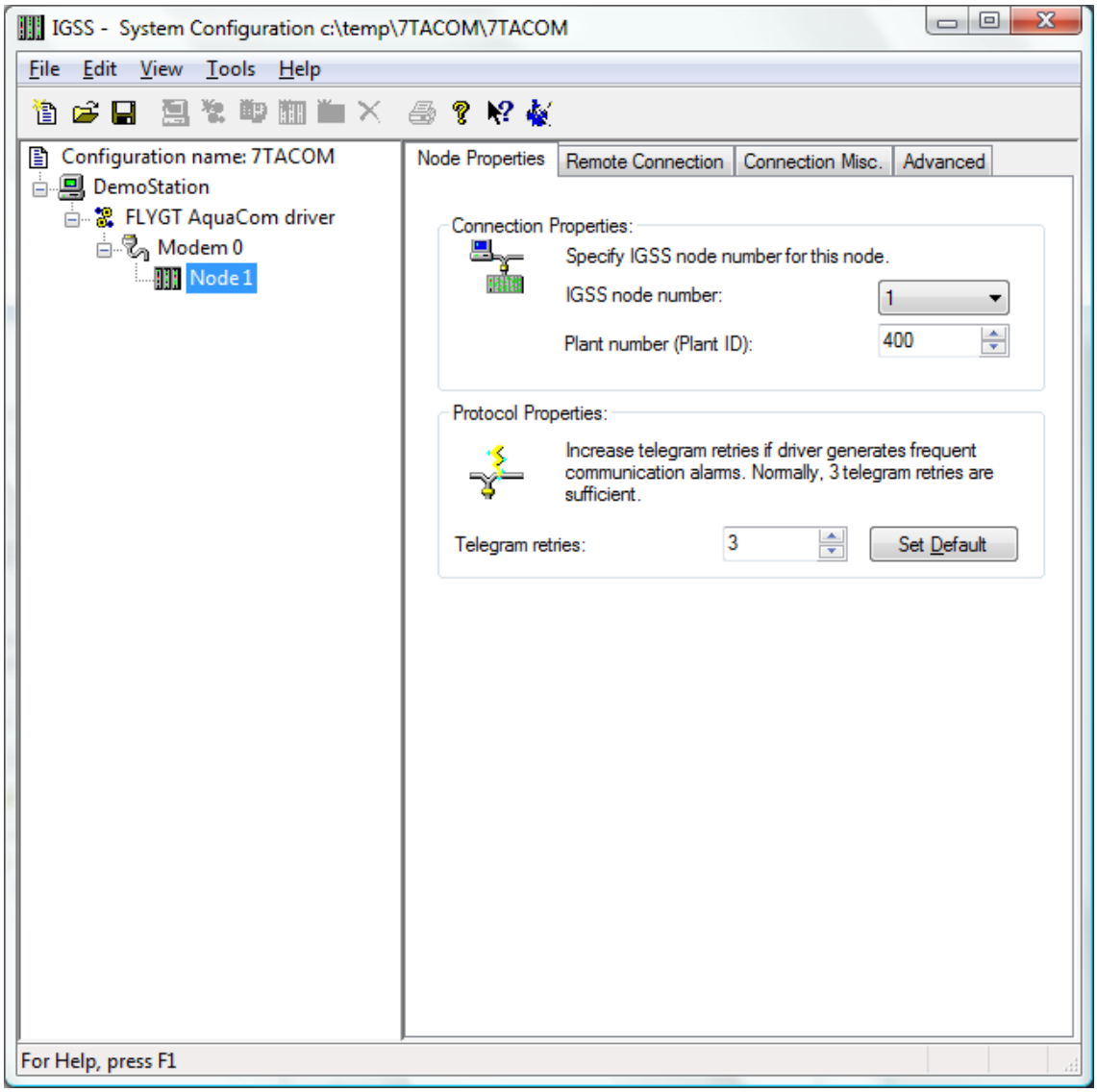
Now you are done setting up the modem connection and can continue setting up the sub stations as described in section 3.4.

3.3 RADIO CONNECTION

Setting up a radio connection is exactly the same as setting up a serial port. Please refer to the “DIRECT CONNECTION” section above.

3.4 CONFIGURING SUBSTATION PARAMETERS

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:



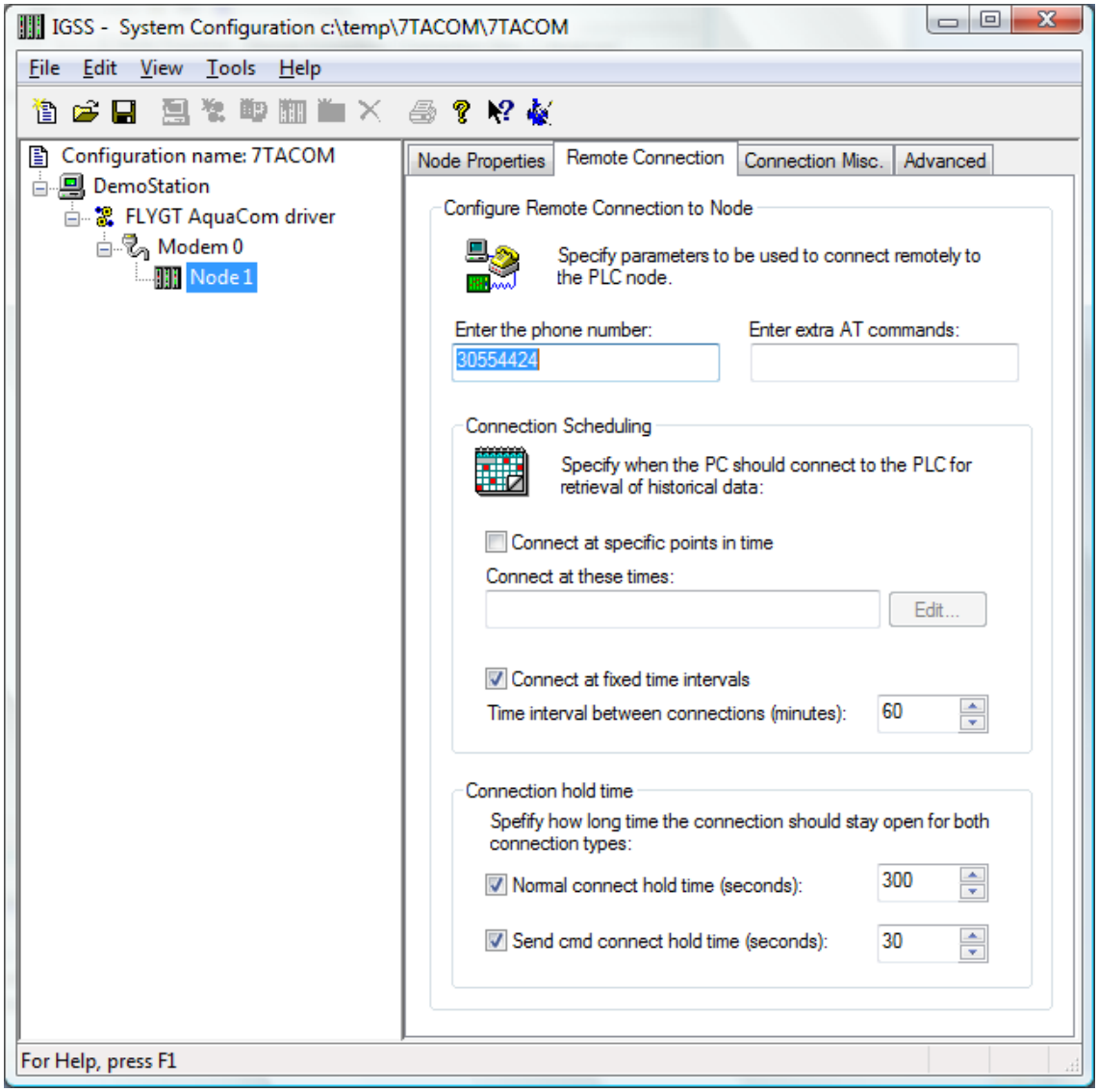
Each PLC node (substation) requires a few fundamental parameters:

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.

Plant Number (Plant ID): Here you must enter the numerical Plant ID (or Plant Number) of each node or sub station. The Plant ID must correspond to the Plant ID number you have set up in the sub station. It is very important that these numbers correspond otherwise communication is not possible and the driver interface will fail with timeout errors (0x4502).

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.

If you are using modem connection then a “Remote Connection” pane will be present while configuring each node:



This dialog is used to configure parameters for use with dialled-up connection:

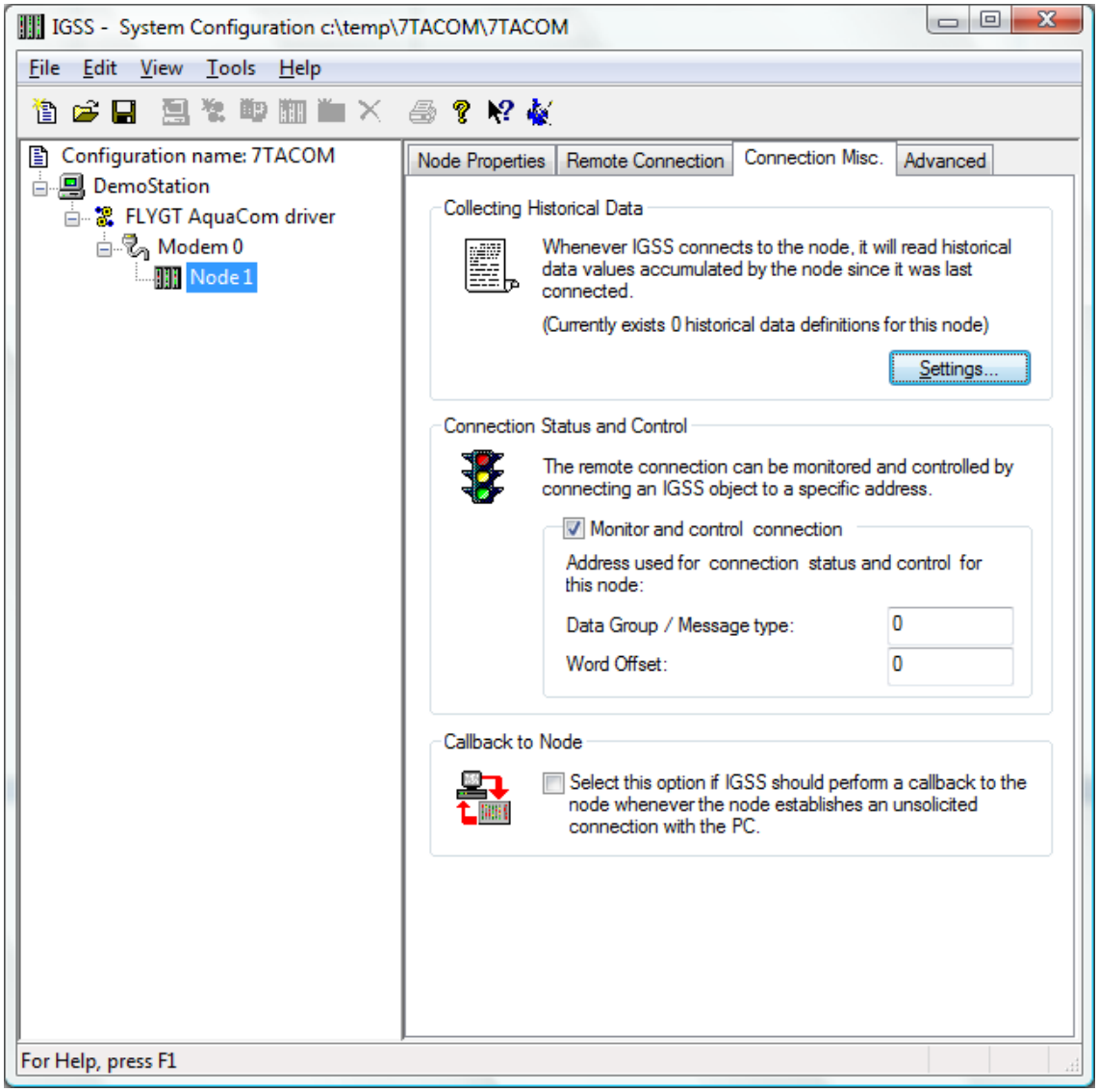
Phone number: Enter the phone number of the sub station.

Enter Extra AT commands: Extra AT commands which is sent to the modem just before dialling is initiated. This option should *only* be used is you TAPI modem driver doesn’t support additional AT commands to be sent though TAPI.

Connection scheduling: The interface driver might be configured for automatic scheduled connection. You can specify either specific points in time (e.g. 00:00;12:30;21:00) or fixed interval (e.g. every 60 or 1440 minutes) depending on your application. When the interface driver connects automatically (at specific times or periodically) then it will fetch historical data stored in the sub station and forward these historical data to IGSS.

Connection hold time: These options allows you to specify how long the modem connection should be kept open after the user have sent a command (Send cmd connect hold time) and how long the connection should be kept open is the user has forced a connection to the station using the IGSS Dialup Object.

Now continue to the “Connection Misc.” pane:



Collecting historical Data: The Flygt AquaCom interface driver will **automatically** fetch historical data (logged data) in the substation using the Flygt “WGH” command. Leave the setting blank.

Connection Status and Control: These parameters are useful when creating an IGSS Dialup-Object to control and monitor the status of the modem connection. The Data Group and Word Offset parameters specified *must* match the corresponding parameters used by the IGSS Dialup-Object.

Callback to node: Call-back is not supported by the Flygt AquaCom interface driver and the option should be lest un-checked.

The “Advanced” pane is not used by the driver and should not be used.

3.5 COMMUNICATION WITH FLYGT PUMPS

By default, the 7TACOM driver channel will only communicate with newer types of Flygt pumps

and you must manually enable the 7TACOM driver channel to communicate with older Flygt pumps.

When you enable the 7TACOM driver channel to communicate with older Flygt pumps, the channel will not be able to communicate with newer types of Flygt pumps.

As a general rule, if you have upgraded your IGSS installation from an older un-supported but running version to a newer supported version and communication errors are now reported on your Flygt pumps, the cause of the errors may well be the 7TACOM driver upgrade which contains a new default setting.

If you have a plant with older and newer Flygt pumps, you must specify a channel for each type of pump and configure the 7TACOM driver separately for each channel. You can set up one channel for the 7TACMO driver for all older Flygt pumps and then configure the 7TACOM driver for that to communicate with the connected pumps.

Afterwards, you can do the same for all newer types of Flygt pumps, setting up a new channel for the 7TCOM driver, connecting the newer Flygt pumps to that channel and configuring the 7TACOM driver for the channel to communicate with the newer pumps.

Channels are defined in the **System Configuration** form in the **IGSS Master** > Design **and Setup** tab > **System Configuration** button and are called interfaces.

Enable the 7TACOM driver to communicate with older Flygt pumps

1. In Windows, click **Start** and enter **Regedit** in the command field op open the **Registry Editor** form.
2. In the left pane of the **Registry Editor** form, click **HKEY_CURRENT_USER** > **Software** > **Schneider Electric** > **IGSS32** > **V10.00.00** > **7TACOM_HKLM** > **Channel1***
3. In the right pane of the **Registry Editor** form, right-click the **7TACOMDefault** registry key and select **Modify** to open the **Edit DWORD (32-Value)** form.
4. In the **Value data** field, enter “0” and click the **OK** button to exit the **Edit DWORD (32-Value)** form and save the new mode.
5. Close the **Registry Editor** form.

*The 7TACOM driver is defined for channel1

The default value for the **7TACOMDefault** registry key is 1, which enables the 7TACOM driver to communicate with newer types of Flygt pumps.

To re-enable the 7TACOM driver to communicate with newer Flygt pumps, retrace the steps described above, and in step 4, enter “1” instead.

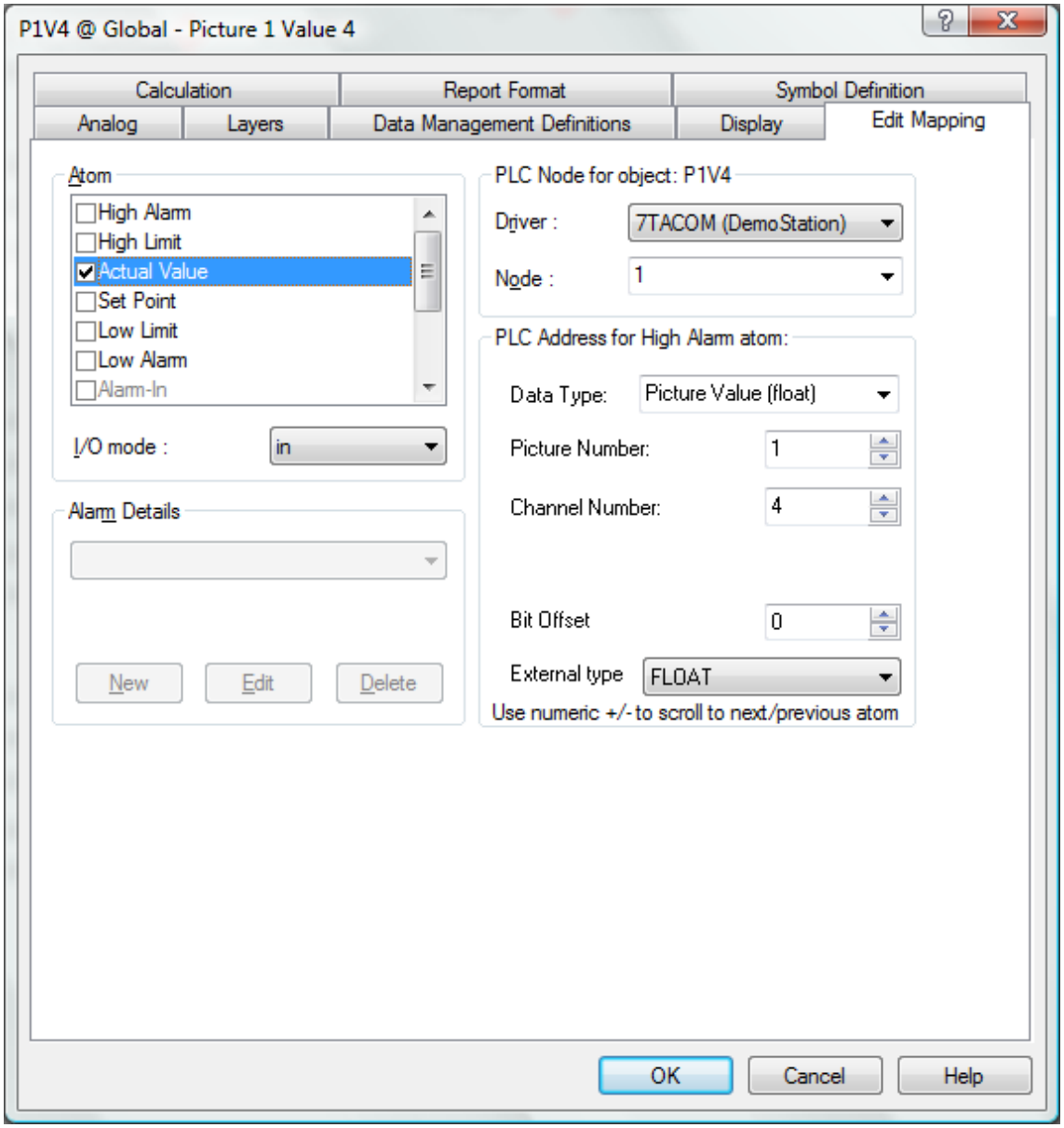
4 CONFIGURING THE OBJECTS

Once the driver and the sub stations have been defined, IGSS Objects and Atoms can be linked to process variable in the sub stations. Various different types of data can be read or written from/to the sub stations. The next sections detail how to configure the links.

When configuring which values should read/written from/to the sub stations it is paramount to an .ATF file which describes the values present in the sub stations. This file must be obtained by the substation vendor.

4.1 CONFIGURING PICTURE VALUES

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



Now select the desired substation number (this is the IGSS node number which you have bound to a specific Plant ID earlier in section 3.4.) and continue by setting be “Data Type” to “Picture Value (float)”. Then specify the picture number which contains the desired value by setting the “Picture Number” and finally select the “Channel Number” for the desired value. Each Picture value in the sub stations is defined uniquely by the “Picture Number” and “Channel Number” parameters. A substation can have one or more Pictures defined and each of these Pictures can have up to 128 channels.

The sections of the .ATF file which contain the definitions of pictures and channels are shown below (Picture 1, Channels 1 to 7). The channel number is the leftmost column:

```
; Picture 1 FGC_Std2P_130
1 7 40 "FGC_Std2P_130.PIC;Status" "FGC_Std2P_130.DYN"
1    -20   1            0.000           1.000      1    0    0 0 ; StLanguage
2    -20   2            0.000          20.000   2000    0    0 0 ; StL1
3    -20   3            0.000          50.000    500    0    0 0 ; StC1
4    -20   4            0.000          50.000    500    0    0 0 ; StC2
5    -20   5            0.000           1.000     60    0    0 0 ; StP1RunTimeDay
6    -20   6            0.000           1.000      1    0    0 0 ; StP1StartsDay
7    -20   7            0.000           1.000     60    0    0 0 ; StP2RunTimeDay
…
…
```

Picture values are read only and should thus have I/O mode set to “In”.

Important: The Flygt AquaCom driver will return all picture values to IGSS as IEEE floats and the external type **MUST** therefore be specified as FLOAT. For the same reason the field “Bit Offset” should not be used and must be fixed at the value 0.

Technical note: Picture values are fetched using the AquaCom command “WGS”.

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

4.2 CONFIGURING REPORT VALUES

In the “Edit Mapping” tab select the 7TACOM driver and node number as described above and continue by setting be “Data Type” to “Report Value (float)”. A Flygt AquaCom station might have one or more report points defined which the interface driver can read. Each report point contains 5 values:

- 00-06: Accumulated values from 00:00h to 06:00h.
- 06-12: Accumulated values from 06:00h to 12:00h.
- 12-18: Accumulated values from 12:00h to 18:00h.
- 18-24: Accumulated values from 18:00h to 24:00h.
- ALL: Accumulated values from 00:00h to 24:00h.

This means that you must specify both the report point number and type of data for this report point (00-06, 06-12 etc.).

Report values are read only and should thus have I/O mode set to “In”.

Important: The driver will ALWAYS fetch the report values from YESTERDAY. This means that if you run your IGSS project on 21st then the driver will fetch the values from the 20th.

Important: The Flygt AquaCom driver will return all report values to IGSS as IEEE floats and the external type **MUST** therefore be specified as FLOAT. For the same reason the field “Bit Offset” should not be used and must be fixed at the value 0.

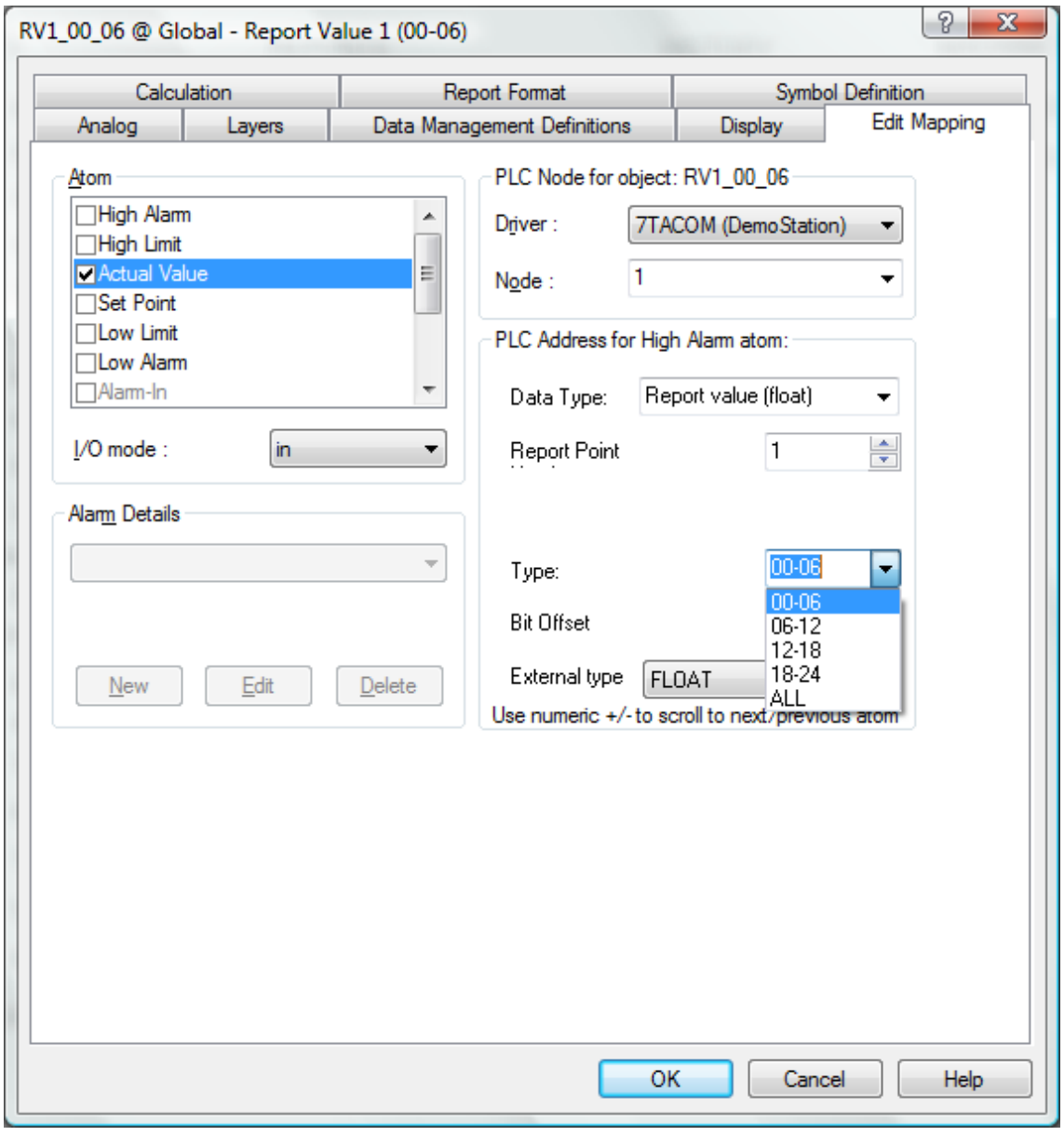
Technical note: Report values are fetched using the AquaCom command “WGD”.

The specification of the actual content of the report points can be found in the .ATF file which

looks like this for report definitions:

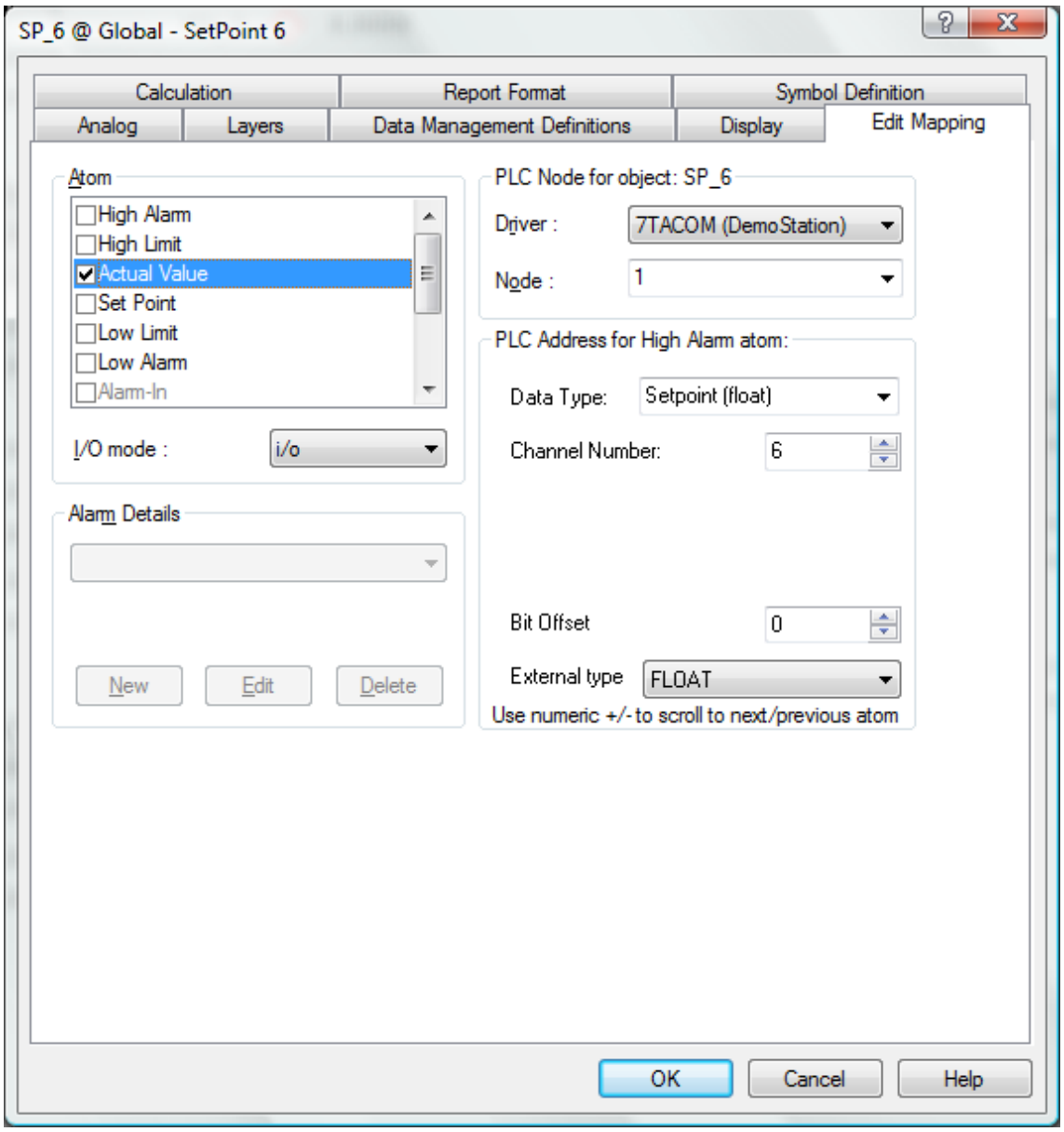
```
;-------------------------------------------------------------------------
; Number of points in Report
;-------------------------------------------------------------------------

4
;-------------------------------------------------------------------------
; Point Text_number Wagon Min Max Max_input_value
; Text number < 1000 located in RAPPTEXT.CFG
; Text number >=1000 located in ANL????.RFG
;-------------------------------------------------------------------------

1   1001   1          0          1   3600 ; {DC} RpP1RunTime
2   1002   2          0          1   3600 ; {DC} RpP2RunTime
3   1003   3          0          1      1 ; {DC} RpP1Starts
4   1004   4          0          1      1 ; {DC} RpP2Starts
```

Addressing of the report points looks like this:



4.3 CONFIGURING SETPOINT VALUES

Start by selecting the 7TACOM driver and the node number from the drop down list of nodes. Now select the “Data Type:” as “Setpoint (float)”. Then select the channel number you want to bind to:



Set point values are accessible for both reading and writing and you might thus select I/O mode as “In”, “Out” or “In/Out” depending on your application.

Important: The Flygt AquaCom driver will return all set point values to IGSS as IEEE floats and the external type **MUST** therefore be specified as FLOAT. For the same reason the field “Bit Offset” should not be used and must be fixed at the value 0.

Technical note: Picture values are fetched using the AquaCom command “MCC”.

The specification of the actual content of the available set points can be found in the .ATF file which looks like this for set points:

```
;--------------------------------------------------------------------------
; Number of channels for setup (0-199)
;--------------------------------------------------------------------------

24
;--------------------------------------------------------------------------
; Data for setup
;
; Channel Type (A/B/C/D/S/T/I/n) Min Max Text Setpoint Time
; "; Gname" defines a group header
;--------------------------------------------------------------------------


;G LEVEL
2   2          -99.990           99.990 "Start Level 1    (m)"            1.500 00:00:00
3   2          -99.990           99.990 "Stop Level 1     (m)"            0.500 00:00:00
4   2          -99.990           99.990 "Start Level 2    (m)"            1.800 00:00:00
5   2          -99.990           99.990 "Stop Level 2     (m)"            0.800 00:00:00
6   2          -99.990           99.990 "High Level       (m)"            2.200 00:00:00
;G PUMP CONTROL
8   2            0.000            2.500 "Stop delay range (m)"            0.000 00:00:00
…
…
```

4.4 CONFIGURING MACHINE COMMANDS

The Flygt AquaCom interface driver supports Machine Control Commands which can be used to start, stop and reverse pumps. These are typically bound to a digital IGSS object which allows the user to send these commands to the substations.

Each machine has 4 basic commands: {F, N, B, M}. The interpretation of these commands might vary but the actual meaning of each command can be found in the .ATF file which might look like this:

```
;--------------------------------------------------------------------------
; Number of machines to control (remote control)
;--------------------------------------------------------------------------

2
;--------------------------------------------------------------------------
; Machine number "Name" Forward Reverse
;--------------------------------------------------------------------------

1   "P1" 1 1 ; {Start pump 1,Stop and block pumps,Return control to automatic,Reset unit}
2   "P2" 1 1 ; {Start pump 2,Stop and block pumps,Return control to automatic,Reset unit}
```

In this case the F-command is “Start Pump”; the N-command is “Stop and block pumps”; the B-command is “Return control to automatic” and the M-command is “Reset unit” for both pumps P1 and P2.

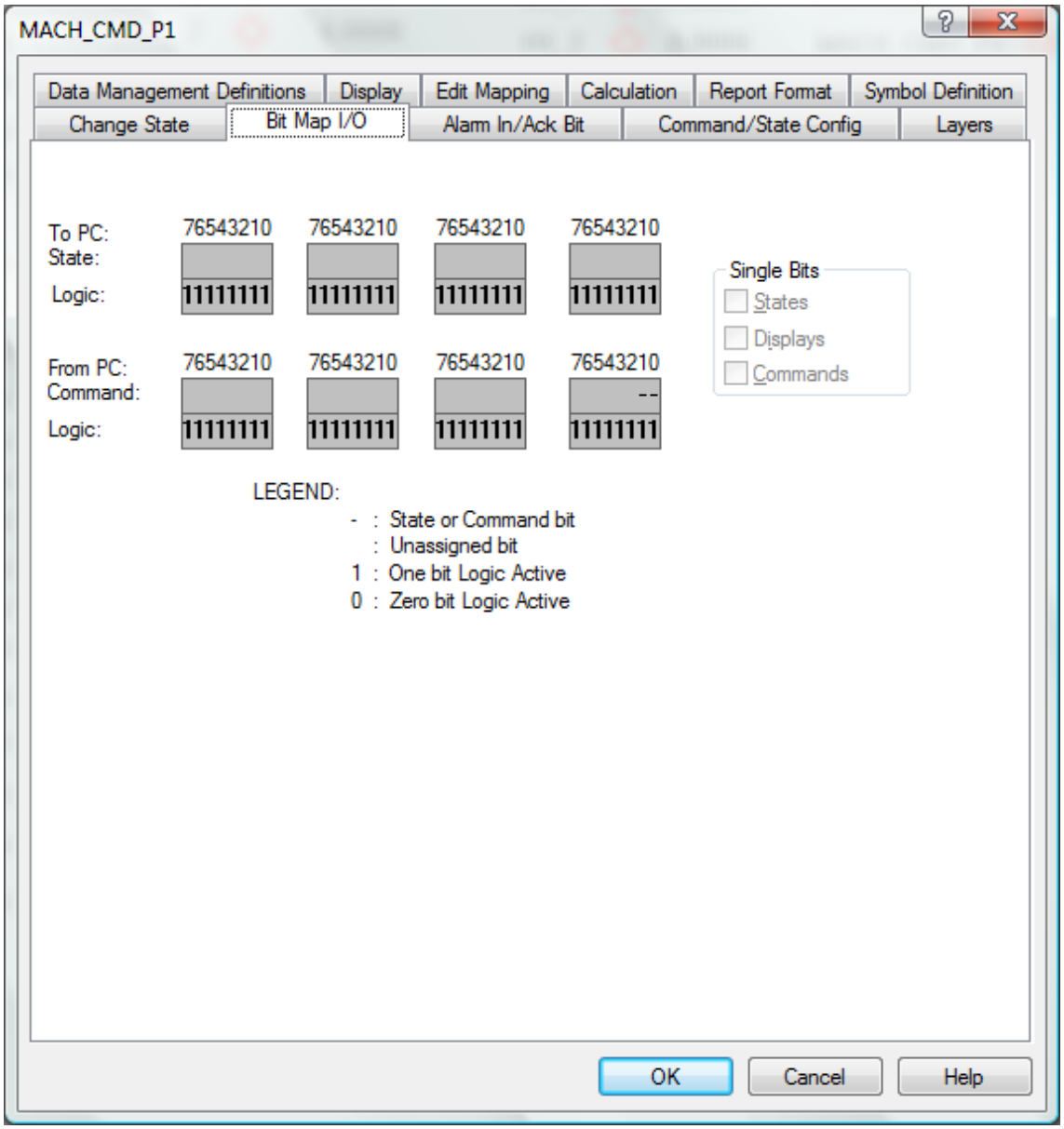
The Flygt AquaCom interface driver encodes the commands with numeric values like this:

- F-Command: Value = 0.
- N-Command: Value = 1.
- B-Command: Value = 2.
- M-Command: Value = 3.

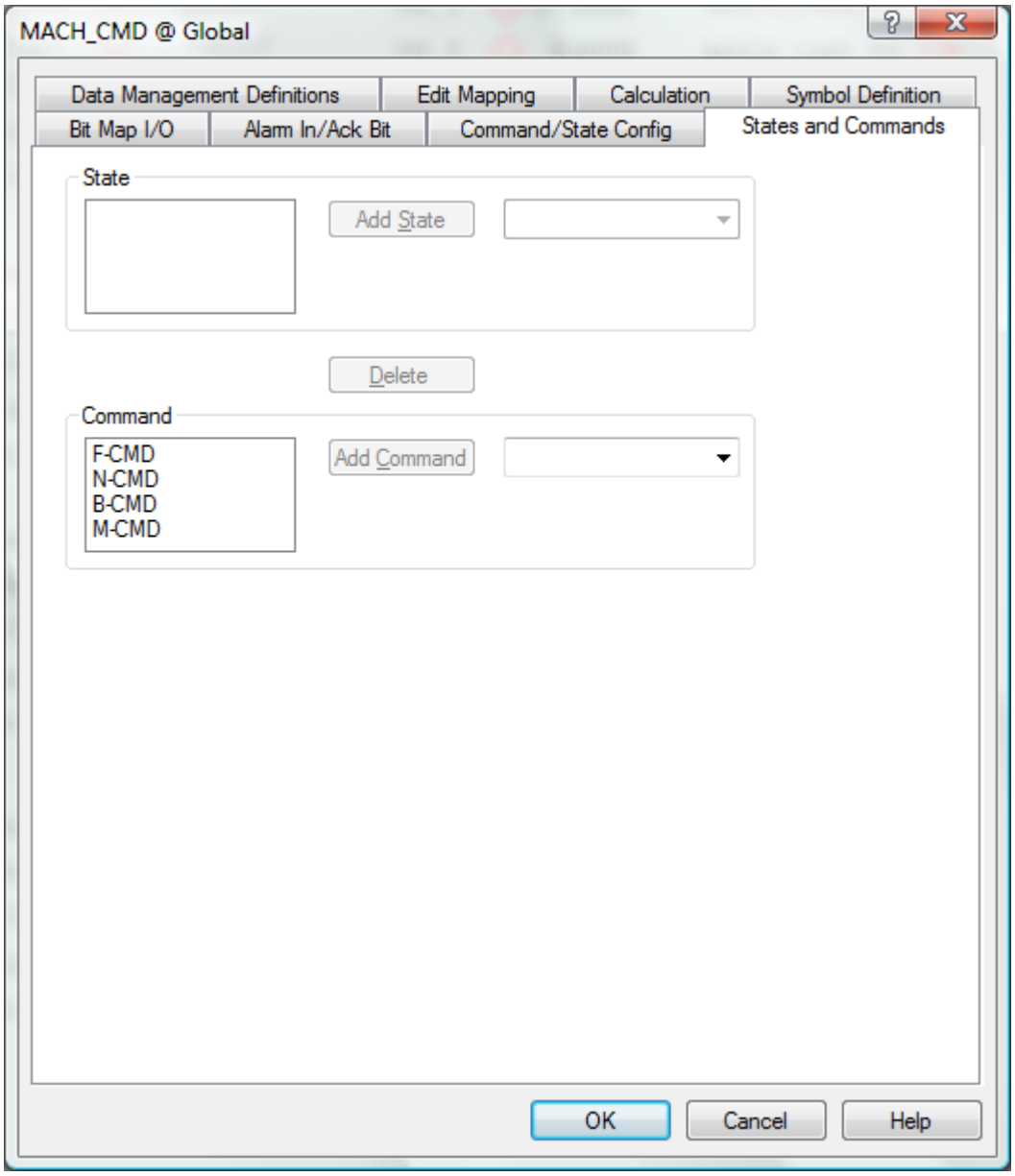
This means that if you want to send the N-command from IGSS to the substation then you should configure IGSS to send the numeric value 1.

This is usually done by create a digital template with 4 states: 0,1,2 and 3 like this:

Define the bit patterns for 0,1,2 and 3:

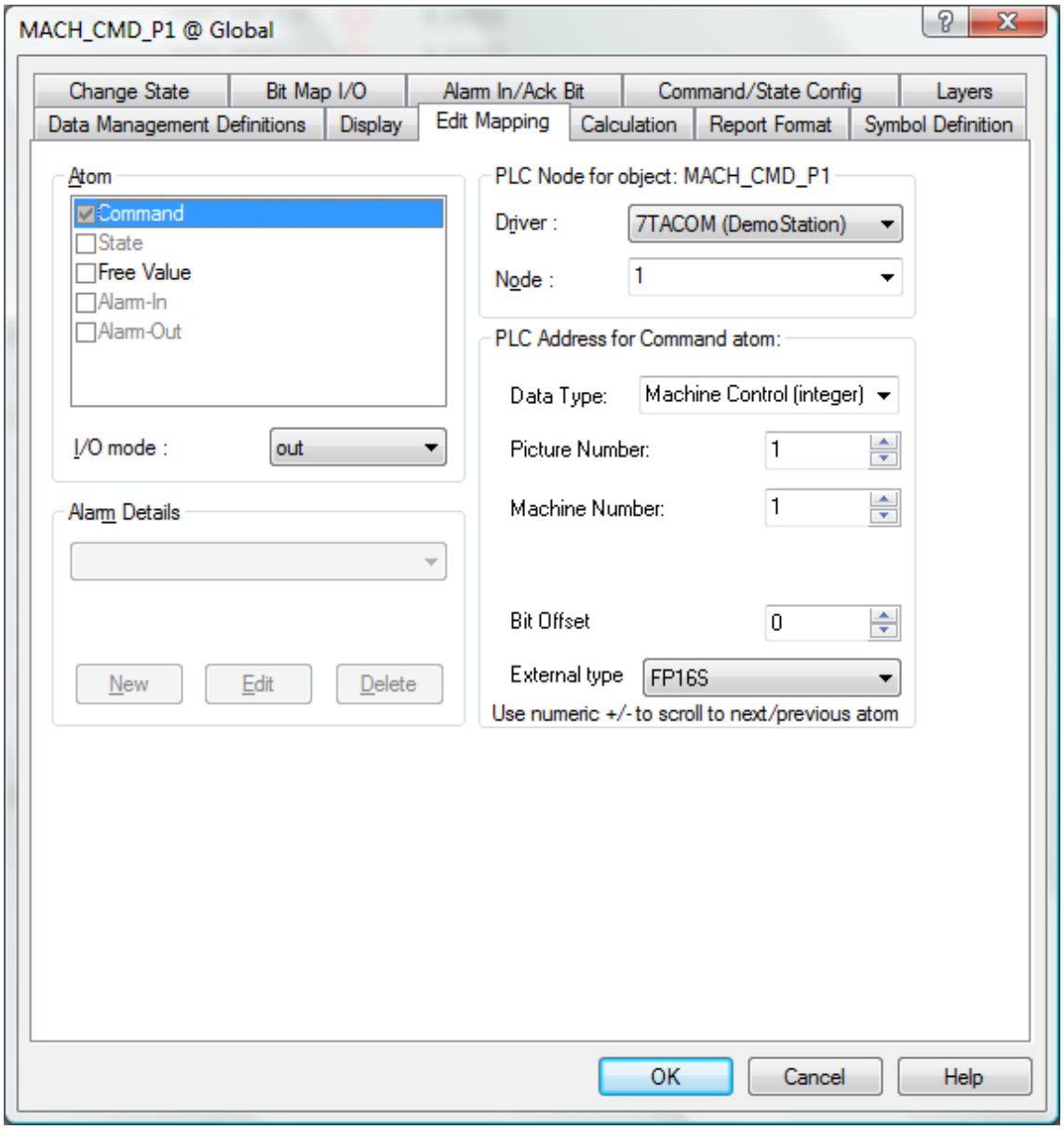


Then continue by giving each of the commands a name:



And finally – once the template has been created – continue to set up the actual addressing for an object instance based on the template like this:

Start by selecting the 7TACOM driver and the node number from the drop down list of nodes. Now select the “Data Type:” as “Machine Control (float)”.



Each Machine is identified by a “Picture Number” (usually 1) and a “Machine Number”. The “Machine Number” of the pumps shown above are shown in the left-most column (“P1” has machine number 1 and “P2” has machine number 2).

External type should be set to FP16S since we want the commands to be encoded as numeric integers before they are sent to the AquaCom interface driver.

I/O mode should be set to out since Machine Control Commands are write only.

4.5 CONFIGURING ALARMS

Substation alarms are supported both with alarm state (Alarm ended and Alarm not ended) and timestamp.

The alarms states are numerically encoded like this:

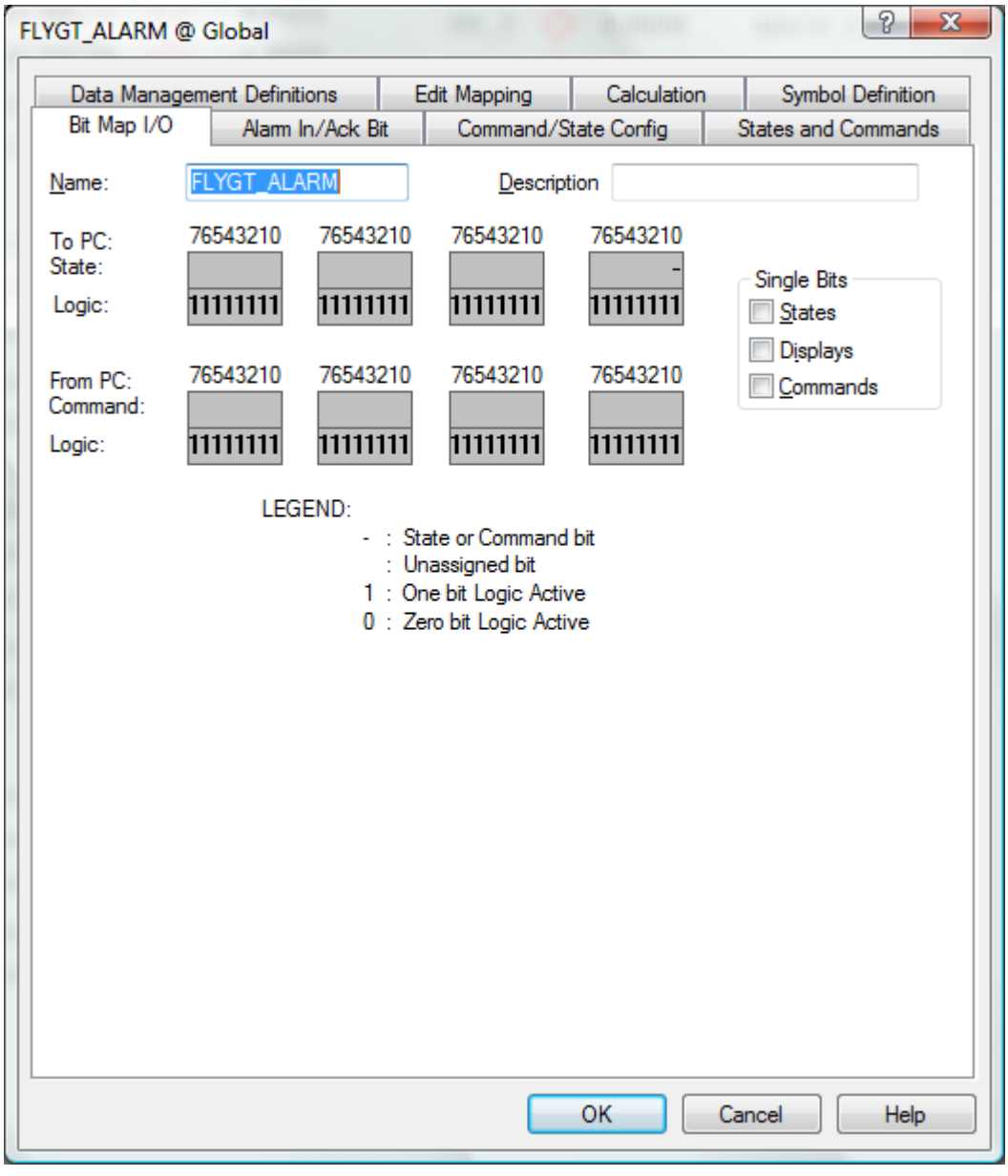
- Value 0x0000 (0) indicates alarm has ended
- Value 0xFFFF (65535) indicates alarm is still active (not ended).

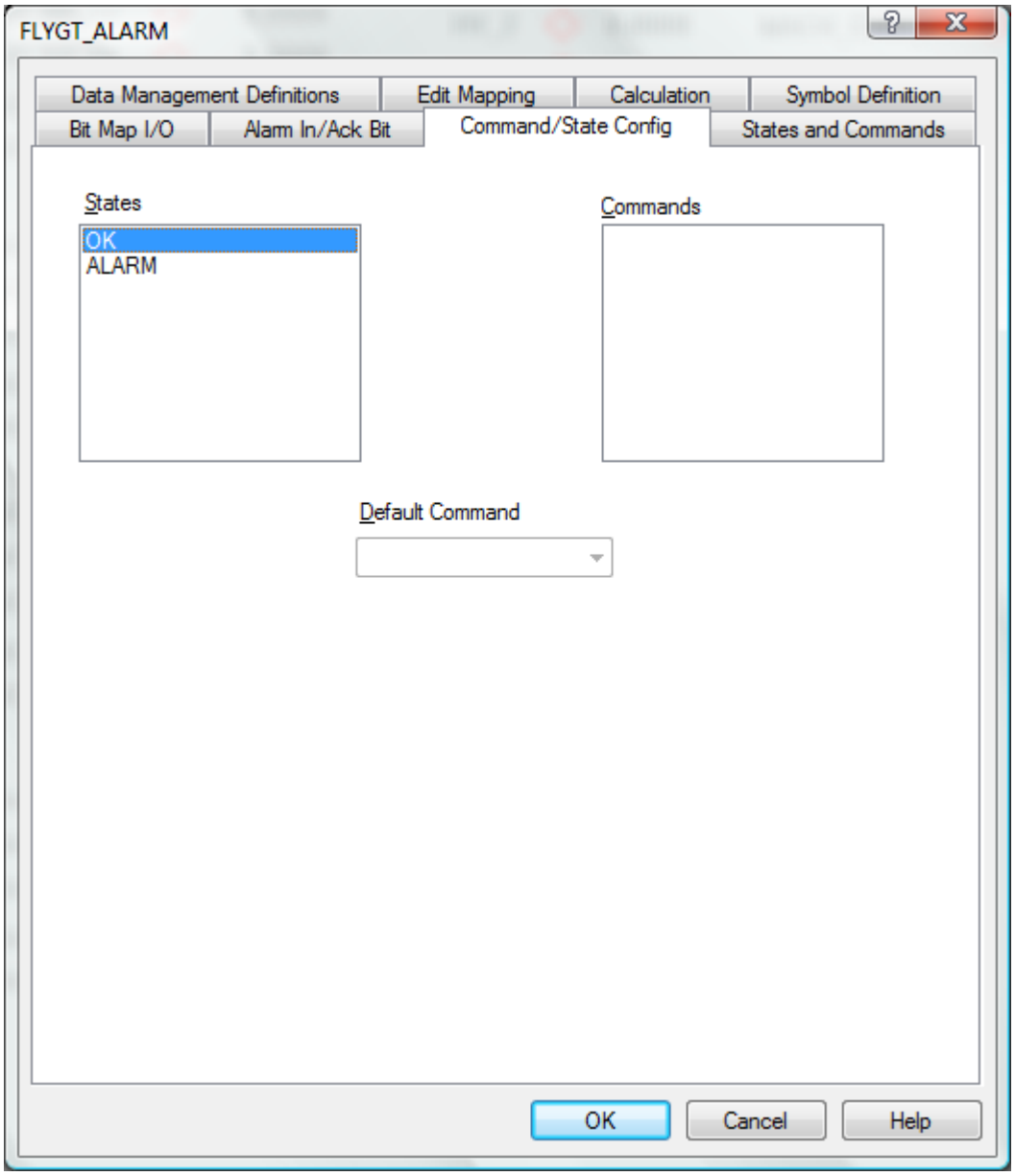
If the interface driver receives an alarm indication from a substation that an alarm is active then it sends the value 0xFFFF (65535) to IGSS. If the alarm is indicated as not active in the substation then the interface driver sends the value 0x0000 (0) to IGSS.

Alarms are time tagged in the substation and the interface driver preserves this timestamp and sends it to IGSS together with the alarm indication value.

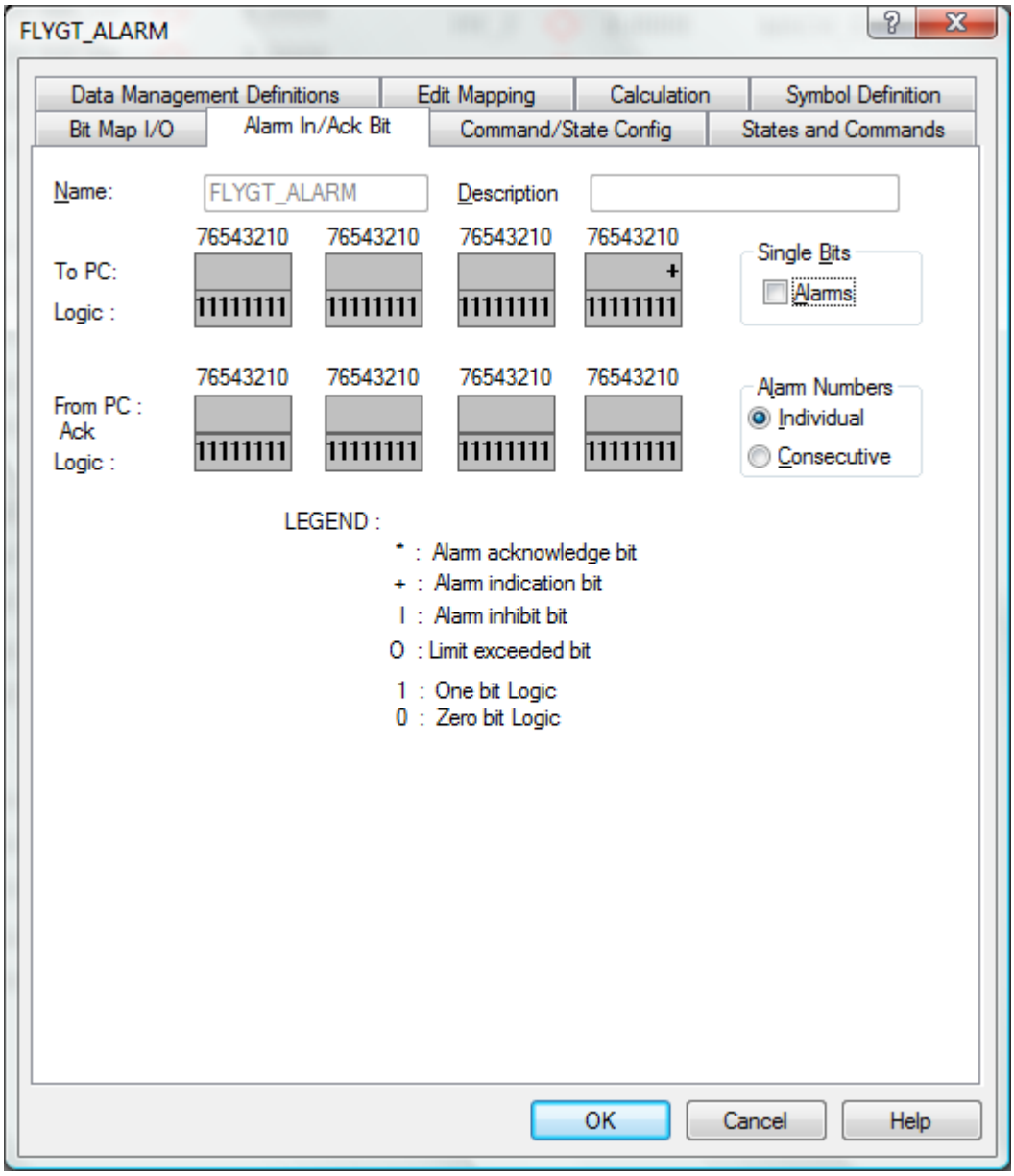
Depending on your application a reasonable encoding of this could be done using an IGSS digital template looking like this:

Define the state indication (0 = OK or 1 = Alarm):

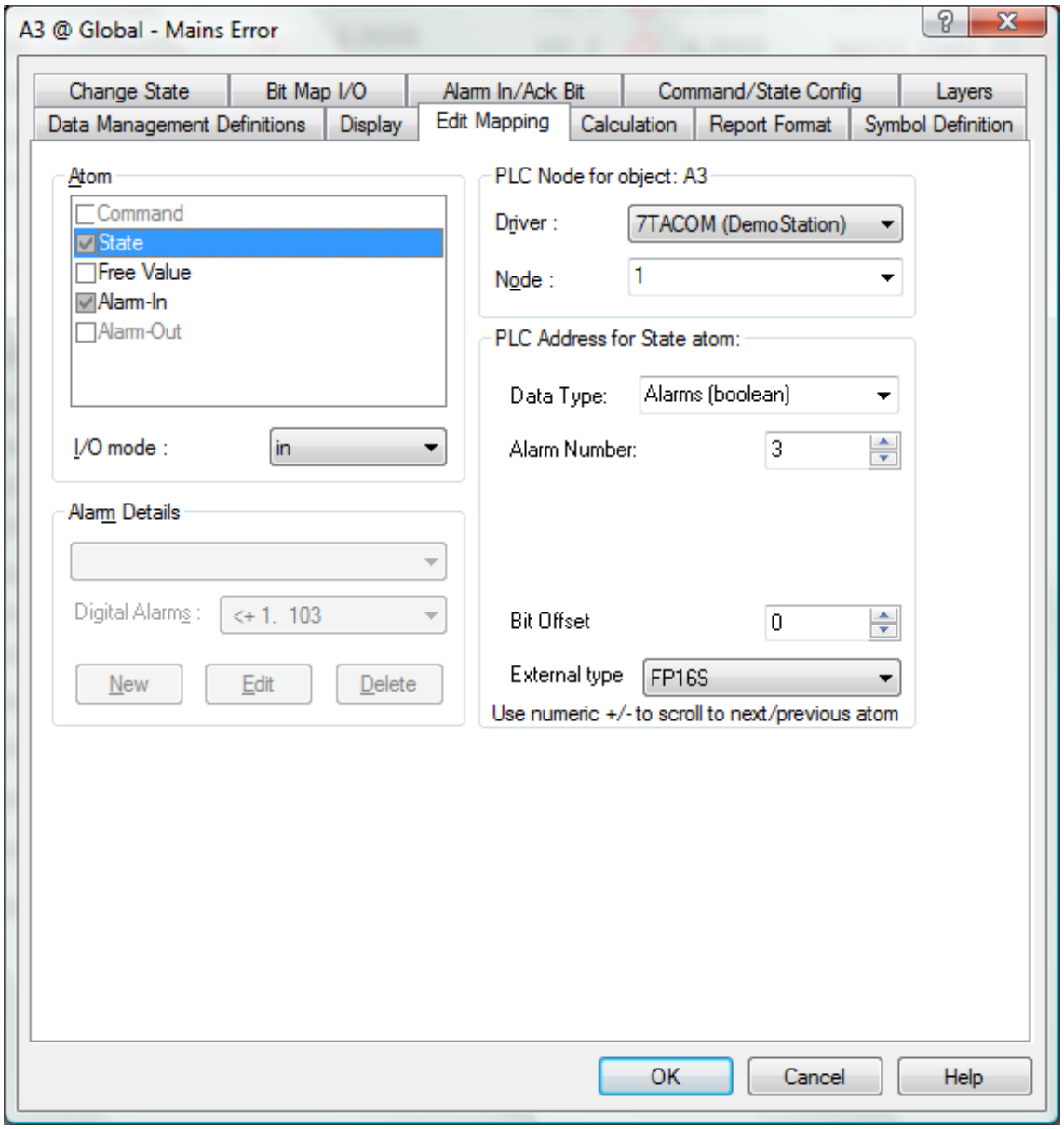




Now define the alarm indication:

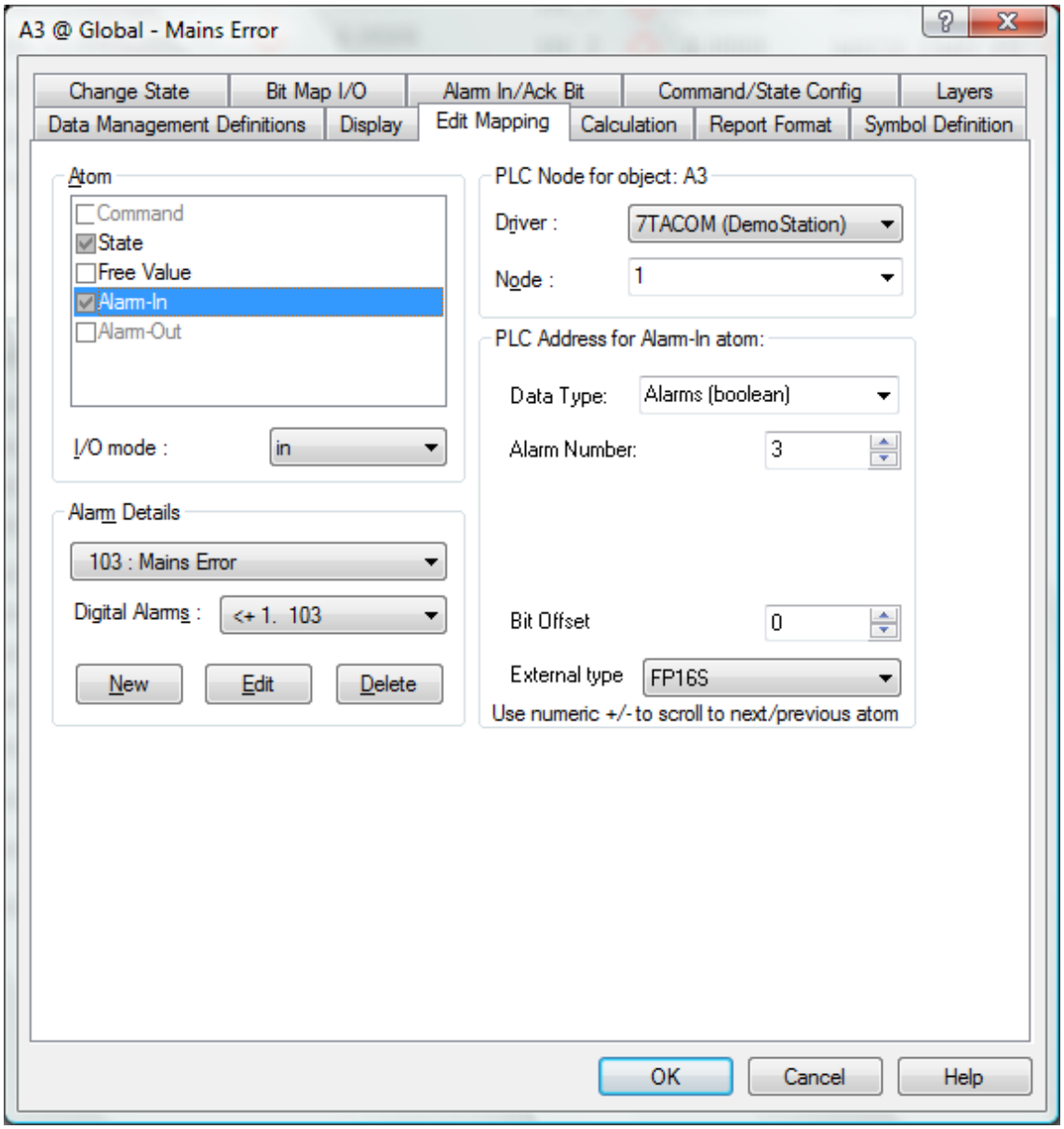


Now we make an instance of an alarm object based on this template:



Define the binding of the state as “Data Type”: “Alarms (boolean)” and select the substation alarm you want to indicate on the state. In this case ”Alarm Ended” (0x0000) will be shown as “OK”, and “Alarm not Ended” (0xFFFF) will be shown as “ALARM” when a mimic of this object is shown on an IGSS diagram.

The alarm state is addressed using the same address:



Which causes IGSS to make an alarm with alarm number 103 (“Mains Error”) if the alarm is indicated as active. If the alarm is indicated as inactive by the substation then IGSS will set the alarm as “Ended”.

The .ATF file section defining the alarms in the substation looks like this:

```
;--------------------------------------------------------------------------
; Alarmcode Initial_Priority
;--------------------------------------------------------------------------

3    A ; Mains error
1    B ; Analogue high level
4    B ; High level float
35   B ; High temperature P1
11   B ; Tripped motor protector P1
8484 B ; P1 Max run time
36   B ; High temperature P2
12   B ; Tripped motor protector P2
8485 B ; P2 max run time
7    B ; External alarm
8505 B ; Sensor Fault
30   B ; Operation error P1
…
…
```

The left most column defines the alarm number to use.

Alarm values are read only and should thus have I/O mode set to “In”. Alarms can only be acknowledged locally in IGSS.

Important: If the substation connects to the interface driver with an unsolicited alarm(s) then the interface driver will automatically fetch the alarm(s) and forward the alarm state and time stamp to IGSS. In this case you can set the “Scan Interval” to “None” in the “Data Management” pane. However, if you want the interface driver to poll the substation for alarms when the driver initiates the call (scheduled or periodical calls) then you **MUST** set a suitable “Scan Interval” for the alarm objects (e.g. 10 secs.).

Important: The Flygt AquaCom driver will return all report values to IGSS as integers and the external type **MUST** therefore be specified as FP16S. For the same reason the field “Bit Offset” should not be used and must be fixed at the value 0.

Technical note: Alarms are fetched using the AquaCom command “WCA”.

4.6 CONFIGURING HISTORICAL VALUES

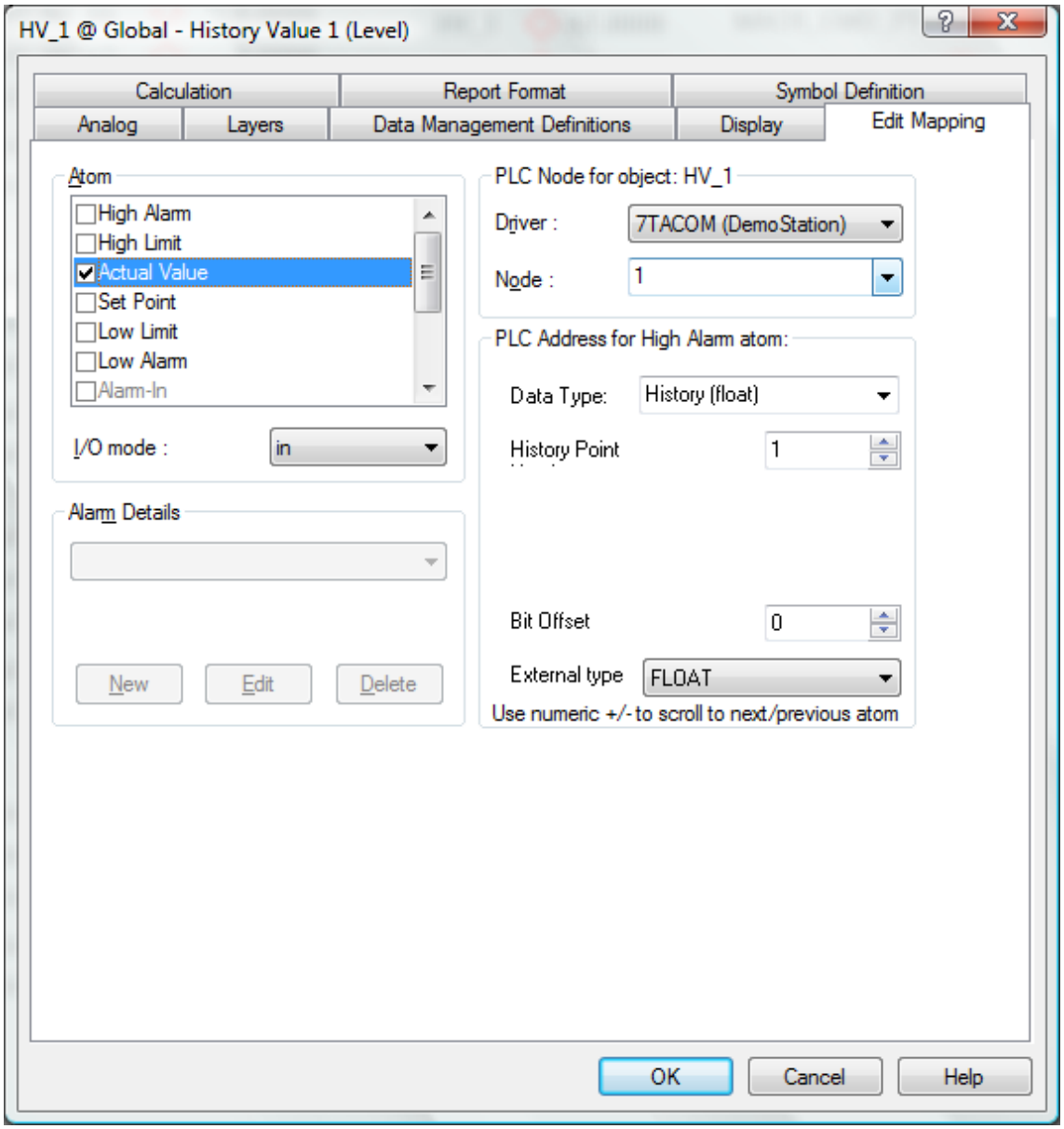
If you use modem or radio to connect to the substations then the Flygt AquaCom interface driver automatically fetches all history records (logged values) from the substation when it establishes a connection. The logged values are then feed into the IGSS system with time stamps and can be used for trending, reporting etc.

The section in the .ATF file which defines the content of the logged data in the substations looks like this:

```
;-------------------------------------------------------------------------
; Number of points for Historical trend
;-------------------------------------------------------------------------

3
;-------------------------------------------------------------------------
; Point Text_number Wagon Min Max Max_input_value
; Text number < 1000 located in RAPPTEXT.CFG
; Text number >=1000 located in ANL????.RFG
;-------------------------------------------------------------------------

1   1005   1         0        20   2000 0 ; {DC} TrLevel
2   1006   2         0        50    500 3 ; {DC} TrP1Curr
3   1007   3         0        50    500 3 ; {DC} TrP2Curr
```

In this case there are 3 sets of history points. Point 1: Level, Point 2: Current of P1 and Point 3: Current of P2.

You map these to (typically analog) objects by selecting “Data Type” as “History (float)” and then select the history point you want to map to like shown below:



Important: The Flygt AquaCom interface driver sends the historical values to IGSS as unsolicited data with time stamps. This means that you must set the “Scan Interval” to “None” in the “Data Management” pane. I/O mode should be set to “In” as historical data are read only. As the driver will send all values in IEEE float format it is **mandatory** to set the external type to FLOAT, and leave the Bit Offset parameter on 0 (zero).

Technical note: Please observe that there might be many historical records stored in the substation. This means that when you connect to the substation for the first time it might fetch a huge amount of historical data. When the interface driver make subsequent connection to the substation it will automatically store the timestamp of the last record and use this timestamp to only fetch records with a newer timestamp. This ensures that no redundant data is fetched. Historical values are fetched using the AquaCom command “WGH”.

5 PERFORMANCE AND THROUGHPUT

The driver is designed for maximum throughput on any given serial link. Timeouts are designed to be fairly relaxed when used with modem communication and the user should expect minimum 1 minute for connecting to reading data from a substation depending on amount of historical data.

Each substation and modem is handled concurrent and independently. This means that if you add more sub stations to the system then the throughput pr. substation should only be affected marginally provided that the PC throughput is sufficient.

6 ERROR CODES

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

While troubleshooting communication- or addressing problems the Driver Test Application (T7T) might be useful to display error codes reported by the driver.

0x4501: _7TACOM_IO_WRITE_ERROR_LEN
Cause: Driver failed to write expected number of characters to COM port or Modem
Action: Check modem setup and cables.

0x4502: _7TACOM_IO_READ_TIMEOUT
Cause: Driver failed to read a reply from expected number of characters to COM port or Modem
Action: Check modem setup and cables. If the timeouts are consistent then there might be mismatch between the PlantID specified in IGSS and the PlantID in the substation. These ID's *must* match otherwise the substation dosn't answer requests from IGSS and thus consistent timeouts will occure.

0x4503: _7TACOM_IO_BCC_ERROR
Cause: The driver received telegram from the RTU with an incorrect checksum.
Action: Check modem and communication settings. Check quality of line and make sure RTU is running correctly.

0x4504: _7TACOM_IO_INCORRECT_FRAMING
Cause: The driver received telegram from the RTU with incorrect framing.
Action: Telegrams are supposed to start with STX and end with CR and contain one '#' sign before the checksum. Check modem and communication settings. Check quality of line and make sure RTU is running correctly.

0x4505: _7TACOM_TOO_MANY_DATA_REQUESTED_PICURE
Cause: The driver was requested to read more data from a picture than the picture actually contains
Action: Check RTU picture definition and make sure all requested picture values are present in station. The sub code of this error contains the picture number (e.g. 1: Picture 1, 2: Picture 2 etc.)

0x4506: _7TACOM_INCORRECT_RESPONCE_FORMAT_PICTURE
Cause: The driver was received a WGS (Picture) response telegram with too few values.
Action: Check RTU picture definition and make sure all requested picture values are present in station. The sub code of this error contains the picture number (e.g. 1: Picture 1, 2: Picture 2 etc.)

0x4507: _7TACOM_ERROR_INVALID_HANDLE
Cause: The communication handle (modem or serial port) used by the driver was invalid
Action: Check that modem connection is established and stabil.

0x4508: _7TACOM_UNSUPPORTED_READ_FUNCTION
Cause: The driver is requested to read data from an unsupported data type.
Action: Please verify that all addresses are valid.
The number of the data type is in the sub error code.
Supported data types are: 0: PICTURE, 1: REPORT, 2: SETPOINTS, 3: HISTORY

0x4509 _7TACOM_UNSUPPORTED_WRITE_FUNCTION
Cause: The driver is requested to write data to an unsupported data type.
Action: Please verify that all addresses are valid.
The number of the data type is in the sub error code.
Supported data types are: 3: SETPOINTS, 5: MACHINE CONTROL

0x450A: _7TACOM_INCORRECT_RESPONCE_FORMAT_REPORT
Cause: The driver was received a WGD (Report) response telegram with an unexpected number of values.
Action: Reports are supposed to have exactly 5 values for each report element.
Check substation report definition.
The sub code of this error contains the actual number of values received

0x450B: _7TACOM_TOO_MANY_DATA_REQUESTED_REPORT
Cause: The driver was requested to read more data from a report than the report actually contains
Action: Check RTU report definition and make sure all requested report values are present in station. The sub code of this error contains the index of the requested value in the report.

0x450C: _7TACOM_NDA_REPLY
Cause: The driver received a NDA (No Data) reply from the substation. This indicated that the requested data is not present in the substation. E.g. User tried to read data from a non existing picture or data from a non existing report. The sub error code indicates the type of data: 0: PICTURE, 1: REPORT, 2: SETPOINTS, 3: HISTORY.
Action: Check substation definitions and make sure all requested values are present in the station.

0x450D: _7TACOM_SCE_REPLY
Cause: The driver received a SCE (Error in telegram) reply from the substation. This indicated that the request sent by the driver was not understood by the substation. The sub error code indicates the type of data: 0: PICTURE, 1: REPORT, 2: SETPOINTS, 3: HISTORY.
Action: Contact 7T technical support.

0x450E: _7TACOM_TOO_MAY_SETPOINTS
Cause: The driver received a telegram reply from a substation with more than 128 indexed set points. The driver only supports up to 128 set points.
Action: Contact 7T technical support.

0x450F: _7TACOM_SETPOINT_INDEX_TOO_HIGH
Cause: The driver was requested to write a set point with too high index. Index must be less than 128. The sub error code contains the rejected index for reference.
Action: Please check addresses of set points.

0x4510: _7TACOM_SETPOINT_TYPE_UNKNOWN
Cause: The driver was requested to write a setpoint to an index with unknown type or text type. The sub error code contains the rejected index for reference.
Action: Please verify that all used indexes are defined in the substation and that no indexes of text type are used.

0x4511: _7TACOM_TOO_FEW_HISTORY_VALUES
Cause: The driver received a history telegram with too few values in a history record.
Action: Please verify that history channels are defined and active in the substation.

0x4512 _7TACOM_INVALID_HISTORY_TIMESTAMP
Cause: The driver received a history telegram with an invalid time stamp.
Action: Please verify that substation is functioning correctly and that the real time clock in the substation is correct.

0x4513: _7TACOM_OUT_OF_HISTORY_BUFFERS
Cause: The driver was temporary out of buffers while fetching historical data from substation.
Action: Increase number og buffers for the driver in System Configuration application (Advanced Pane).

0x4514: _7TACOM_INVALID_NUM_ALARM_PARAMETERS

Cause: The driver received an alarm telegram (ALR) with an incorrect number of parameters. There should always be exactly 15 parameters. The subcode contains the actual number of parameters.
Action: Check substation configuration.

0x4515: _7TACOM_INVALID_ALARM_TIMESTAMP
Cause: The driver received an alarm telegram with an invalid time stamp.
Action: Please verify that substation is functioning correctly and that the real time clock in the substation is correct.

0x4516: _7TACOM_OUT_OF_ALARM_BUFFERS
Cause: The driver was temporary out of buffers while fetching alarm data from substation.
Action: Increase number of buffers for the driver in System Configuration application (Advanced Pane).

0x4517: _7TACOM_IO_INVALID_PORT_HANDLE
Cause: The modem or serial port handle was reset during communication.
Action: Retry the operation at a later time and check that modem connection is stabile and phone lines are OK.

0x4518: _7TACOM_INVALID_MACHINE_CONTROL_COMMAND
Cause: The driver was requested to send a machine control command with an invalid content. Supported commands are: 0 (F-command), 1 (N-command), 2 (B-command) and 3 (M-command). Sending any other value than 0,1,2 or 3 will give this error. For reference the subcode contains the code of the command the driver was requested to send.
Action: Review the configuration of the commands that are sent as Machine Control Commands.