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Notes on the Implementation of “I87” IO Driver 870-5-101

The IEC 870-5-101 spec is broad based and this documents explains how this IO driver integrates the standard with the Fix SCADA or an **OPC client**.

The following table lists the internal driver data types & how they map to IEC 870 protocol messages. Note that many IEC messages map to the same Internal datatype if this is logically achievable. For example the analog integer type MV handles both IEC Scaled & normalised values based on the assumption that Scaling & signal conditioning is handled in the SCADA database in the normal way. In addition this driver specifically allows the user to read & write to the same address, .. If this is undesirable, simply use different addresses. “When written” means the operator sets a new value to a AO,DO,AR,AO block in the database. It is desirable from a SCADA point of view that the RTU should send the Value of these addresses back during General Interrogation. Some of the driver “datatypes” are not actually used for IO but rather trigger another action, example TSYNC & Interrogate. Normally the Interrogate Pollblock is the only one that has a poll time configured (SPI,DPI,MV should have polltime disabled by typing “-”).

Driver Features

- Each Serial port can operate in Master Mode OR Slave mode OR Listen Only
  - The Slave & listen modes may be used for debugging or test set applications
  - If interface to a third party SCADA is required without removing the national control Master station, you can use this driver in parallel
  - Slave mode may simulate an RTU in remote scada & protocol conversion applications
- Most IEC parameters are set-able
- Timestamps are sent to OPC client in master mode (the ability to support time stamps in slave mode may be supported in future versions via OPC V 3 if this is required)
- Timestamped events are logged to text files and to an ODBC database
- Select & Execute Secure Commands are supported, however this requires an understanding of the implementation at the application level.

Command Mapping for MASTER mode

The following table list which IEC message types correspond to which Internal IO addresses.

I87 Internal Address Type	**Description**	**Messages for received data**	**Messages sent when written to**
SPI	Single-point information	M_SP_NA_1, M_SP_TA_1, C_SC_NA_1, M_SP_TB_1	C_SC_NA_1
DPI	Double-point information	M_DP_NA_1, M_DP_TA_1, C_DC_NA_1, M_DP_TA_1	C_DC_NA_1
MV	16 bit Measured values, Normalised & Scaled	M_ME_NA_1, M_ME_TA_1, M_ME_NB_1, M_ME_TB_1, M_ME_ND_1, C_SE_NA_1, M_ME_TD_1	C_SE_NA_1 Or C_SE_NB_1
TSYNC	Time sync rtu's	C_CS_NA_1	C_CS_NA_1
Interrogate	Force RTU to send update data	C_IC_NA_1	C_IC_NA_1
FLOAT	Floating point / real numbers	M_ME_NC_1, M_ME_TC_1, M_ME_TF_1	C_SE_NC_1
BITS	Packed bit strings of 32 bits	M_BO_NA_1, M_BO_TA_1, M_BO_TB_1	C_BO_NA_1
IT	Integrated totals (counters)	M_IT_NA_1, M_IT_TA_1, M_IT_TB_1	C_CI_NA_1
STP	Step postions	M_ST_NA_1, M_ST_TA_1, M_ST_TB_1	C_RC_NA_1

Internal Address format

```
RTU:TYPE:ASDU:OBJECT:<BIT>
```

General rules: Driver configuration is setup with arrays of information obects, Most of these objects are 16 bit words, in OPC the presence of the <BIT> specifies a Digital/Boolean address otherwise it is an Analog address.

For examples of valid I/O addresses (OPC Item ID's), refer to Supported Mnemonics table below. The following are descriptions of the parts of the I/O Address:

RTU (Remote Terminal Unit) indicates the name you assigned in the RTU Name field of the Device Definition in the I/O Driver Configuration program. It is an alphanumeric tag that the Database Builder uses to differentiate poll records collected from different field devices (RTU's). The RTU name associates a name with a RTU Data link address.

Type specifies the data type area in the Driver memory (see table above)

One of (SPI,DPI,MV,BITS,FLOAT,IT,STATUS).

*Note The STATUS type is used to access the COMMS status of the RTU see the section Controlling Alarms and Comms Alarms

ASDU	IEC870-5-101,.Specifies the ASDU number of the I/O point within the RTU. Also referred to as the “Common address”. Many systems set this to the same as the Datalink/RTU address.
Object	The object number of the desired address also referred to as the Information Object address.
Bit	The Bit is only used on Digital addresses. Desired address may be entered as a number OR TEXT address. The bit entry is used for Digital blocks and ranges from 0 – 15. Note this driver copies all the data received from the RTU into a 16 bit word. For an SPI address this means Bit 0 is the value. For the BITS datatype the range is 0-31.

Format of Internal Status addresses

Each RTU has a assigned range of internal addresses, that do not map to a configured poll block, these addresses are used for status information about health of the communications to each RTU

Master mode RTU Communication status (read only)

DI address <devname>:STATUS:0:0:0 = 0 means successfully polling this device
DI address <devname>:STATUS:0:0:0 = 1 means communication failure to this device

AI Address <devname>:STATUS:0:0 = 0 means ok, Non zero means comms fail

Reset RTU Communications (Write only)

DO address <devname>:STATUS:0:1:0 In master mode write a 1 to force comms reset to RTU

Slave mode RTU Communication status (read only)

AI Address <devname>:STATUS:0:2 is a monostable timer that is set to 3000 millisec every time a poll is received for this RTU. If the value is Zero then no poll has been received for at least 30 seconds.

Control Master / Listen only mode (read & write)

This address is used to change the Listen only mode at runtime (startup state is set in channel settings). This allows dual redundant SCADA masters to use the same communications channel. SCADA side scripting must force one of the two SCADA’s to master mode & the other to Listen only mode

DI address <devname>:STATUS:0:5:0 = 1 means Listen only

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Format of Digital Input data

**Note the you can use the bit number OR the text equivalents eg. SPI:1:1:INVALID and SPI:1:1:7 are the same.

SPI data (Single point inputs)

Bit def	IEC def	Input Description	values	Example
Bit 0	7.2.6.1 SPI	value for SPI (on/off)	1/0 Bool	<rtu>:SPI:1:1:VAL
Bit 1	Not used			
Bit 2	Not used			
Bit 3	Not used			
Bit 4	7.2.6.1 SPI	Blocked / not Blocked	1/0 Bool	<rtu>:SPI:1:1:BLOCK
Bit 5	7.2.6.1 SPI	Substituted / not substituted	1/0 Bool	<rtu>:SPI:1:1:SUB
Bit 6	7.2.6.1 SPI	topical / not topical	1/0 Bool	<rtu>:SPI:1:1:TOP
Bit 7	7.2.6.1 SPI	Invalid=1	1/0 Bool	<rtu>:SPI:1:1:INVALID
Bit 8-15	NA	COT of last received data	1-30 Analog	<rtu>:SPI:1:1|S&M,,,8:31

IO address for Digital Addresses <rtu>:SPI:<asdu>:<obj>:bit (bit=0 usually)
IO address for Analog Addresses <rtu>:SPI:<asdu>:<obj>

Note ** for OPC the Last ":" indicates a Boolean / digital address otherwise analog Many SCADA's prefer to read the array of bits as an analog value.

DPI data (Double point inputs)

Bit def	IEC def	Input Description	Clientvalues	Example
Bit 0..1	7.2.6.2 DPI	value for DPI (on/off)	0..3 Analog	<rtu>:DPI:1:1|S&M,,,0:3
Bit 3		Not used		
Bit 4	7.2.6.2 DPI	Blocked / not Blocked	1/0 Boolean	<rtu>:DPI:1:1:BLOCK
Bit 5	7.2.6.2 DPI	Substituted / not substituted	1/0 Boolean	<rtu>:DPI:1:1:SUB
Bit 6	7.2.6.2 DPI	topical / not topical	1/0 Boolean	<rtu>:DPI:1:1:TOP
Bit 7	7.2.6.2 SPI	Invalid=1	1/0 Boolean	<rtu>:DPI:1:1:INVALID
Bit 8-15	NA	COT of last data	1-30 Analog	<rtu>:DPI:1:1|S&M,,,8:31

IO address for DI\DO\DR\MDI blocks <rtu>:DPI:<asdu>:<obj>:bit (bit=0 usually)

With iFix you would normally use an MDI block addressing bits 0&1 with text descriptions of the 4 states

OPC example "RTU1:DPI:1:100|S&M,,,0:3" results in analog shift(0) & mask(3) results in analog values 0..3

SPI & DPI Slave mode notes

- On startup the master receives data with the "invalid" flag set Until the SCADA client writes a value, after which the value written is sent (:INVALID defaults to 0, i.e. OK)
- If you write from the SCADA client to any bit including bits like :INVALID it sends a spontaneous update to the master.
- If you set a bit like :INVALID it retains this value so if set & you then write to the :VALUE the master receives "invalid" spontaneous data.

MV data (analogs)

Normally you would use an AI/AR block addressing <rtu>:MV:<asdu>:<obj>. Scaling the data to engineering units is done with FIX / OPC signal conditioning.

*note if you enable outputs in the fix you can write to the same addresses (setpoints)

OPC example “RTU1:MV:1:100|LIN,-100.0,100.0” will result in the IEC normalised values scaling from -100 to 100 % you can replace the 100 with your engineering unit range.

Read in the manual about the LIN Signal conditioning & many others

Example 4ma live zero input with 15 bit AD converter scaled to 1-100%

“RTU1:MV:1:100|PROP,0.0,100.0,6553:32767,%”

“RTU1:MV:1:100” = address of MV

will scale inputs of 6553-32767 to 0 - 100 %, you can replace the 100 with your engineering unit range.

Analog Status Bits

By Specifying an extra :<> bit parameter after the info object the status bits may be read

MV Status data

Bit def	**IEC def**	**Input Description**	**values**	**Example**
Bit 0	QDS	1=Overflow (OV)	1/0 Bool	<rtu>:MV:1:1:OV
Bit 1	Not used			
Bit 2	Not used			
Bit 3	Not used			
Bit 4	QDS	Blocked / not Blocked	1/0 Bool	<rtu>:MV:1:1:BLOCK
Bit 5	QDS	Substituted / not substituted	1/0 Bool	<rtu>: MV:1:1:SUB
Bit 6	QDS	topical / not topical	1/0 Bool	<rtu>: MV:1:1:TOP
Bit 7	7.2.6.1 SPI	Invalid=1	1/0 Bool	<rtu>: MV:1:1:INVALID
Bit 8-15	NA	COT of last received data	1-30 Analog	<rtu>: MV:1:1|COT

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Format of Output Command data

SPI & DPI commands

***Note both master & slave mode use the same internal addresses of Input / Commands, by simply writing to an address it sends a command to the address. This means you can have inputs & outputs at the same address which is not actually allowed by the IEC standard.

The I87 driver sends the 8 bits of data at the specified address, for this reason you can use DR & DO blocks in FIX addressed to <rtu>:SPI:<asdu>:<obj>:0 (bit 0). However it is recommended that you use AR/AO blocks instead as this will allow full control of the IEC 870 features. The 8 bits are defined as in the IEC spec SCO 7.2.6.15 which is:

Bit def	**IEC def**	**Description**	**Value to write from OPC Script for on/off**
Bit 0 & 1	SCS & DCS the on/ off state of the command	Bit 0 is the command value for SPI (on/off)	0/1 for SP 0/1/2/3 for DP
Bit 2..7	QOC 7.2.6.26		
Bit 2..6 = 0		No additional definition	0
Bit 2..6 = 1		Short pulse duration	5/NA
Bit 2..6 = 2		Long pulse duration	9/NA
Bit 2..6 = 3		Persistent output	13/12
Bit 7			
Bit 7 = 0	Execute	Execute command	0/1 for SP 0/1/2/3 for DP
Bit 7 = 1	Select	Select Control object	128
Bit 8-Bit13	NA	COT of Confirmation	
Bit 14	NA	Negative Confirm	1=Negative Confirm
Bit 15	NA	Select Bit of Confirm	1=Selected

Example : Select & Execute Secure DP command using 1 Analog tag

1. Create analog Integer read / write address “<rtu>:SPI:<asdu>:<obj>”
2. Set value 128 (bit 7 =1 means Select)w
3. wait for value to go >= 32767, means selected (driver sets bit 15 when RTU returns selected confirm)
4.
    a. Close contactor, Write value = 1 (bit 7 =0 means Execute)
    b. Open contactor, Write value = 0 (bit 7 =0 means Execute)

For Feedback Monitoring of commands, use bit 14(:NEG) & 15(:SEL). If Bit 14 goes high after a command then the RTU sent back a Negative Activation Termination.

SPI & DPI commands Slave mode notes

- If the Slave addresses of a Block are to be setpoints written by the master the Flag “Disable Interrogation response” should be set in the block settings, otherwise the value is returned as a Input during interrogation.

Actions that occur during command write:

1. Commands sent by the Master set the :VALUE bits & set the timestamp of local PC time of receipt.
2. In addition the following bits are set Bit 10 (:TOG) is toggled (changed) everytime a command is received, this allows the SCADA to sense the command even if Master sends the same value. Bit 12 (:WRIT) is set, this may be used to indicated that a value has been received by the slave since startup.
3. The OPC server sends a OnChange() with new timestamp even if the value does not change.

MV Setpoints

MV Setpoints Slave mode notes

- If the Slave addresses of a Block are to be setpoints written by the master the Flag “Disable Interrogation response” should be set in the block settings, otherwise the value is returned as an Input during interrogation.

Actions that occur during setpoint write:

4. Setpoints sent by the Master set the analog value & set the timestamp of local PC time of receipt.
5. In addition the following status bits are set Bit 10 (:TOG) is toggled (changed) everytime a command is received, this allows the SCADA to sense the command even if Master sends the same value. Bit 12 (:WRIT) is set, this may be used to indicated that a value has been received by the slave since startup.
6. The OPC server sends a OnChange() with new timestamp even if the value does not change.

Format of Integrated totals (Counters)

The value returned by OPC address <rtu>:IT:<asdu>:<obj> is the count value. If the IEC data is invalid the value is 0.

**Note for OPC please use this address “<rtu>:IT:<asdu>:<obj>|DWRD” this forces the datatype to Double word.

To read the IT Sequence number use the address “<rtu>:IT:<asdu>:<obj>|ITSQ

Counter Interrogation

Sending Counter interrogations is performed by writing to addesses <rtu>:IT:<asdu>:<obj> the value of the bits 0-7 written are sent directly to the RTU.

Format of Step Position Information

The value returned by OPC address <rtu>:STP:<asdu>:<obj> is the VTI (value with transient state as defined in IEC section 5.2.1.5).

VTI := CP8{Value,Transient}
Value := I7[1..7]<-64..+63>
Transient := BS1[8]

<0> := equipment is not in transient state
<1> := equipment is in transient state

Example 1: “RTU1:STP:1:22|S&M,,,0:127” Will read the step pos 22 & apply the Shift & mask signal conditioning shifting 0 bits & AND’ing with 127 (bits 0-7) which results in the +-63 step position

Example 2: “RTU1:STP:1:22|S&M,,,7:1” Will read the step pos 22 & apply the Shift & mask signal conditioning shifting 7 bits & AND’ing with 1 (bit 8) which results in the transient state

If a Digital Block in fix OR the extra :<bit> filed is used via OPC the QDS information may be accessed

QDS := CP8{OV,RES,BL,SB,NT,IV}
OV := BS1[1]<0..1>
<0> := no overflow
<1> := overflow
RES = RESERVE:= BS3[2..4]<0>
BL := BS1[5]<0..1>
<0> := not blocked
<1> := blocked
SB := BS1[6]<0..1>
<0> := not substituted
<1> := substituted
NT := BS1[7]<0..1>
<0> := topical
<1> := not topical
IV := BS1[8]<0..1>
<0> := valid
<1> := invalid

Example:

RTU1:STP:1:22:7 is the IV-invalid bit

Regulating Step commands

Regulating Step commands use the same addresses as the Step positions

RCO := CP8{RCS,QOC}
RCS=Regulating step
command state := UI2[1..2]<0..3>
<0> := not permitted
<1> := next step LOWER
<2> := next step HIGHER
<3> := not permitted
QOC := CP6[3..8]{QU,S/E} see below QOC
QOC := CP6{QU, S/E}
QU := UI5[3..7]<0..31>
<0> := no additional definition *
<1> := short pulse duration (circuit-breaker), duration determined by a system parameter in the outstation
<2> := long duration pulse, duration determined by a system parameter in the outstation
<3> := persistent output
<4..8> := reserved for standard definitions of this companion standard (compatible range)

<9..15> := reserved for the selection of other predefined functions **
<16..31>:= reserved for special use (private range)

S/E := BS1[8]<0..1>

<0> := Execute
<1> := Select

Example 1 Address "RTU1:STP:1:22" is an analog value

Writing a value of 1 means STEP UP
Writing a value of 2 means STEP DOWN

Extracted from 870-5-101 © IEC:1995, page 171

8 Interoperability

This document serves to specify which options and features of the IEC 870-5-101 standard protocol are supported by the ProScada "I87" IO driver for OPC Clients.

Note that all supported and edited notes in red were added by the developers of the I87 driver.

8.1 Network configuration (network-specific parameters)

Note : The I87 driver supports Master Mode when it communicates with slave devices. The driver can also be set to Slave mode, in this case the driver passively waits to be polled by the device on the other end. The data sent to the master is the current data written from the SCADA database. In addition The I87 driver supports a "Listen" Mode. The Listen mode allows a SCADA node to Read & Log data being polled by another Master, This mode may also be used for Dual redundant masters.

- ☒ Point-to-point
- ☐ Multiple point-to-point
- ☐ Multipoint-party line
- ☒ Multipoint-star

8.2 Physical layer

(network-specific parameter)

Transmission speed (control direction)

Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 Recommended if >1 200 bit/s	Balanced interchange circuit X.24/X.27	
☒ 100 bit/s	☒ 2400 bit/s	☐ 2400 bit/s	☐ 56000 bit/s
☒ 200 bit/s	☒ 4800 bit/s	☐ 4800 bit/s	☐ 64000 bit/s
☒ 300 bit/s	☒ 9600 bit/s	☐ 9600 bit/s	
☒ 600 bit/s	☒ 19200 bit/s	☐ 19200 bit/s	
☒ 1200 bit/s	☒ 38400 bit/s	☐ 38400 bit/s	

Transmission speed (monitor direction)

Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 Recommended if >1 200 bit/s	Balanced interchange circuit X.24/X.27	
☒ 100 bit/s	☒ 2400 bit/s	☐ 2400 bit/s	☐ 56000 bit/s
☒ 200 bit/s	☒ 4800 bit/s	☐ 4800 bit/s	☐ 64000 bit/s
☒ 300 bit/s	☒ 9600 bit/s	☐ 9600 bit/s	
☒ 600 bit/s	☒ 19200 bit/s	☐ 19200 bit/s	
☒ 1200 bit/s	☒ 38400 bit/s	☐ 38400 bit/s	

Note : The I87 driver does allow RTS/CTS with RTS toggling, which may be used with 2 wire RS485 line drivers where the RTS line is used to energise the transmitter. The same configuration may be used for Radio modems. However in both cases it is recommended that you use automatic flow control modems. The driver polls continuously as fast as possible i.e. next poll occurs immediately on completion of previous, This behaviour can be controlled with the "Interpoll timer setting" to slow it down

Extracted from 870-5-101 © IEC:1995, page 173

8.3 Link layer

(network-specific parameter)

Frame format FT 1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission procedure

☒ Balanced transmission

☒ Unbalanced transmission

Frame length

255 Maximum length L (number of octets)

Address field of link

☐ Not present (balanced transmission only)

☒ One octet

☐ Two octets

☐ Structured

☒ Unstructured

Note We can Modify the Link Field address size on request

8.4 Application Layer

Transmission mode for application data

Mode 1 (Least significant octet first), as defined in clause 4.10 of IEC 870-5-4, is used exclusively in this companion standard.

Common address of ASDU

(system-specific parameter)

☒ One octet ☒ Two octets

Information object address

(system-specific parameter)

☒ One octet ☐ structured

☒ Two octets ☒ unstructured

☒ Three octets

Cause of transmission

(system-specific parameter)
☐ One octet ☐ Two octets (with originator address)

Extracted from 870-5-101 © IEC:1995, page 175

Selection of standard ASDUs

Process information in monitor direction

(station-specific parameter)

Note The supported information below, simply represents that which has been requested so far. If your application requires more functionality please request what you need. We can add most of these at no extra cost.

Note on Time tagging in iFix
This IO driver is capable of displaying the time tagged information in the iFix alarm summary. Ie the time you see in the alarm summary IS the remote time tagged time. In addition all time tagged events may be logged to an ODBC datasource.

★	<1> := Single-point information	M_SP_NA_1
★	<2> := Single-point information with time tag	M_SP_TA_1
★	<3> := Double-point information	M_DP_NA_1
★	<4> := Double-point information with time tag	M_DP_TA_1
★	<5> := Step position information	M_ST_NA_1
★	<6> := Step position information with time tag	M_ST_TA_1
★	<7> := Bitstring of 32 bit	M_BO_NA_1
★	<8> := Bitstring of 32 bit with time tag	M_BO_TA_1
★	<9> := Measured value, normalized value	M_ME_NA_1
★	<10> := Measured value, normalized value with time tag	M_ME_TA_1
★	<11> := Measured value, scaled value	M_ME_NB_1
★	<12> := Measured value, scaled value with time tag	M_ME_TB_1
★	<13> := Measured value, short floating point value	M_ME_NC_I
★	<14> := Measured value, short floating point value with time tag	M_ME_TC_1
★	<15> := Integrated totals	M_IT_NA_1
★	<16> := Integrated totals (counter) with time tag	M_IT_TA_1
☐	<17> := Event of protection equipment with time tag	M_EP_TA_1
☐	<18> := Packed start events of protection equipment with time tag	M_EP_TB_1
☐	<19> := Packed output circuit information of protection equipment with time tag	M_EP_TC_1
☐	<20> := Packed single-point information with status change detection	M_PS_NA_1
★	<21> := Measured value, normalized value without quality descriptor	M_ME_ND_1

★	<30> := Single-point information with CP56Time2a timetag	M_SP_NB_1
★	<31> := Double -point information with CP56Time2a timetag	M_DP_NB_1
★	<32> := Step position with CP56Time2a timetag	M_ST_TB_1
★	<33> := Bitstring of 32 bits with CP56Time2a timetag	M_BO_TB_1
★	<34> := Measured value normalised with CP56Time2a timetag	M_ME_TF_1
★	<35> := Measured value scaled with CP56Time2a timetag	M_ME_TE_1

★

☐ <36> := Measured value floating point with CP56Time2a timetag	M_ME_TF_1
☒ <37> := Integrated totals (counter) CP56Time2a timetag	M_IT_TB_1

Process information in control direction

(station-specific parameter)

☒ <45> := Single command	C_SC_NA_1
☒ <46> := Double command	C_DC_NA_1
☒ <47> := Regulating step command	C_RC_NA_1
☒ <48> := Set point command, normalized value	C_SE_NA_1
☒ <49> := Set point command, scaled value	C_SE_NB_1
☒ <50> := Set point command, short floating point value	C_SE_NC_1
☒ <51> := Bitstring of 32 bit	C_BO_NA_1

System information in monitor direction

(station-specific parameter)

☒ <70> := End of initialization	M_EI_NA_1

System information in control direction

(station-specific parameter)

<100> := Interrogation command	C_IC_NA_1
<101> := Counter interrogation command	C_CI_NA_1
<102> := Read command	C_RD_NA_1
<103> := Clock synchronization command	C_CS_NA_1
<104> := Test command	C_TS_NB_1
<105> := Reset process command (slave mode only)	C_RP_NC_1
<106> := Delay acquisition command	C_CD_NA_1

Parameter in control direction

(station-specific parameter)

Contact us If you need this

<110> := Parameter of measured value, normalized value	P_ME_NA_1
<111> := Parameter of measured value, scaled value	P_ME_NB_1
<112> := Parameter of measured value, short floating point value	P_ME_NC_1
<113> := Parameter activation	P_AC_NA_1

File transfer

(station-specific parameter)

This is unlikely to be implemented, however contact us if you need this

<120> := File ready	F_FR_NA_1
<121> := Section ready	F_SR_NA_1
<122> := Call directory, select file, call file, call section	F_SC_NA_1
<123> := Last section, last segment	F_LS_NA_1
<124> := Ack file, ack section	F_AF_NA_1
<125> := Segment	F_SG_NA_1
<126> := Directory	F_DR_TA_1

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8.5 Basic application functions

Station initialization

(station-specific parameter)

☒ Remote initialization

General Interrogation

(system- or station-specific parameter)

☒ global

☐ group 1	☐ group 7	☐ group 13
☐ group 2	☐ group 8	☐ group l4
☐ group 3	☐ group 9	☐ group 15
☐ group 4	☐ group 10	☐ group 16
☐ group 5	☐ group 11	
☐ group 6	☐ group 12	Addresses per group have to be defined

Clock synchronization

(station-specific parameter)

☒ Clock synchronization

Command transmission

(object-specific parameter)

☒ Direct command transmission
☒ Direct set point command transmission

☒ Select and execute command
☒ Select and execute set point command
☐ C_SE_ACTTERM used

☒ No additional definition
☒ Short pulse duration (duration determined by a system parameter in the outstation)
☒ Long pulse duration (duration determined by a system parameter in the outstation)
☒ Persistent output

*Note this IO driver allows direct access to all bits of the IEC definition, to implement many of the above requires application layer interaction with different addresses, this is however simple cripting with most SCADA systems.

Transmission of Integrated totals

(station- or object-specific parameter)

☒ Counter request
☒ Counter freeze without reset

☒ General request counter
☒ Request counter group 1
☒

- ☑ Counter freeze with reset
- ☑ Counter reset
- ☐ Request counter group 2
- ☑ Request counter group 3
- ☑ Request counter group 4

Addresses per group have to be defined

Parameter loading

(object-specific parameter)

☐ Threshold value

☐ Smoothing factor

☐ Low limit for transmission of measured value

☐ High limit for transmission of measured value

Parameter activation

(object-specific parameter)

☐ Act/deact of persistent cyclic or periodic transmission of the addressed object

File transfer

(station-specific parameter)

☐ File transfer in monitor direction

☐ File transfer in control direction

Appendix A : Change log

V 7.9.24

1. Increased number of channels from 16 – 32
2. added functionality of new datatypes to slave mode better support for status bits in slave mode. STP, IT etc
3. OPC server now sets status bad if the polling program fails

Bug fixes:

1. fixed text file import

V 7.9.23

1. Added Step position datatype to slave mode
2. Allow typing of addresses with text instead of bit numbers eg. ..:VALUE,:INVALID
3. fixed master mode bug where it was only sending commands every 2nd time the OPC client writes
4. Buffering of events so client does not loose events in the case of multiple change of state of single address in one IEC message