This file documents the list of new features, enhancements, and "adjusted anomalies", starting with the most recent Rel 2.11, followed by the 2.10.x, 2.9.x, 2.8.x (see end of document for earlier releases). Each page's header shows the version for that current page.

1. New Hardware *(these require Do-more Technology Version 2.11)*

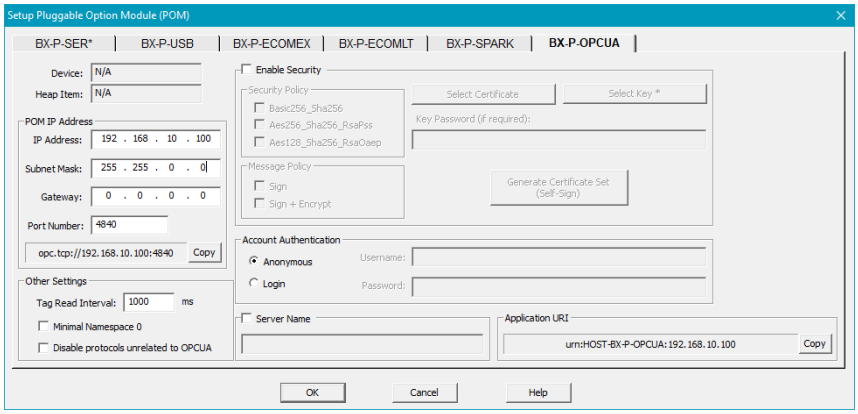
BX-P-OPCUA	BRX PLC Pluggable Option Module: **OPC Unified Architecture (UA) Server** Communications Module (1.03) • Define up to 500 Data Points of elements in the BRX PLC using the Element Documentation Editor • Service up to 5 Client sessions with up to 5 Subscriptions per session simultaneously via OPC UA TCP • Supports multiple security options (see 2. below)
BX-P-SPARK	BRX PLC Pluggable Option Module: **Sparkplug B Edge Node** Communications Module • Define up to 300 Tags of elements in the BRX PLC using the Element Documentation Editor • Supports multiple MQTT Broker security options (see 3. below)
BX-P-USB-C	BRX PLC Pluggable Option Module: USB C Programming port
BX-16TDY2	BRX 16 point 24VDC 1A Discrete Output Expansion Module
BX-16TD2W	BRX 16 point Diagnostic Discrete Output Expansion Module detects overload, short circuits and wire breaks
BX-16NN	BRX 16 point 48VDC Discrete Input Expansion Module
BX-16TN2	BRX 16 point 48VDC Sourcing Discrete Output Expansion Module 1A
BX-8NN8TN2	BRX 16 point 48VDC Discrete Combo Expansion Module, 8 pt. In, 8 pt. Sourcing Out

2. IIOT - OPC Unified Architecture Server (BRX Only) *(requires Do-more Technology Version 2.11)*

Make your BRX PLC be an **OPC UA Server** by adding the BX-P-OPCUA to the POM slot.

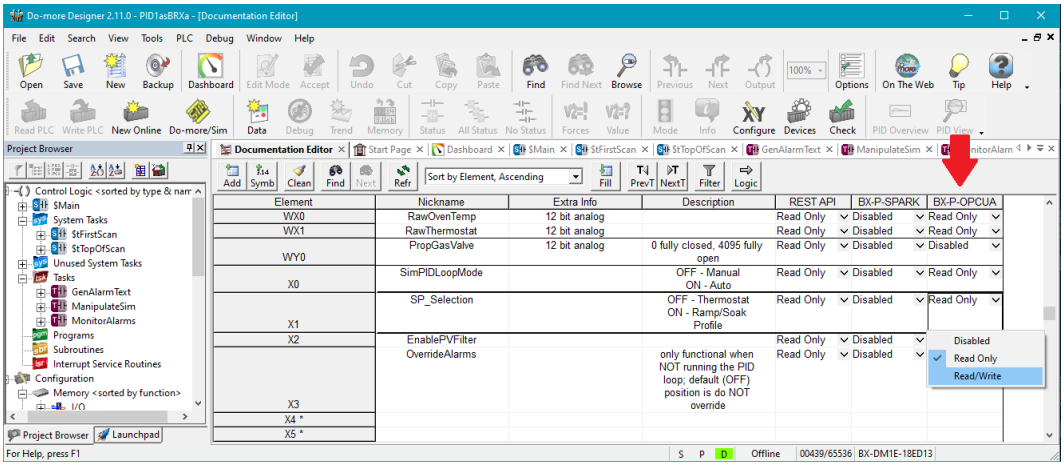
a. Configure BX-P-OPCUA POM

From the **PLC->System Configuration** dialog's *CPU* entry page, hit *[Setup POM]* button, select *BX-P-OPCUA* tab to configure the PLC's OPC UA Server. Configure the various security settings based on your Network and Clients' security needs.



b. Map Specific BRX Elements as OPC UA Data Points

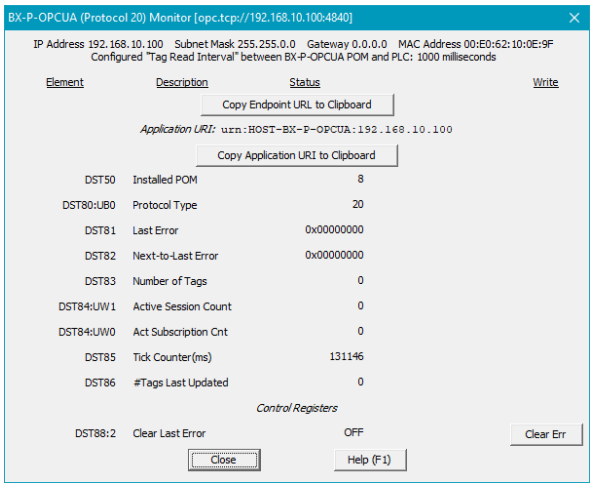
From the **Element Documentation Editor**, select the set of BRX Elements that will be available to any OPC UA Client as Data Points. Everything is DISABLED by default.



c. Monitor the Live Status of the OPC UA Client POM

Select **Debug->OPC UA Monitor** menu to launch the monitor dialog. The table lists out the System DST Elements, Descriptions, and the current Status values.

All of these System DST values are available to your PLC logic or HMI. (see the *Element* column for the specific DST IDs along with any specific casts). One of the DST's contains Control Bits for Inhibiting Communications and Resetting Error Codes.

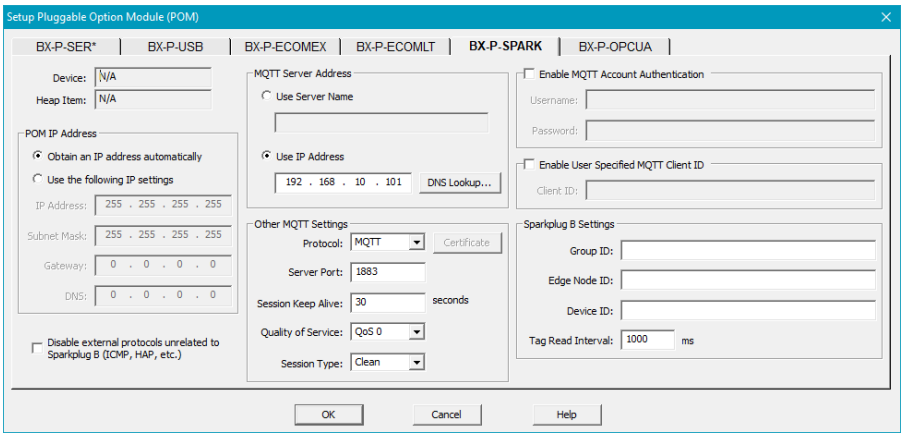


3. IIOT - Sparkplug B Edge Node (BRX Only) *(requires Do-more Technology Version 2.11)*

Make your BRX PLC become a **Sparkplug B Edge Node Client** by adding the BX-P-SPARK to the POM slot.

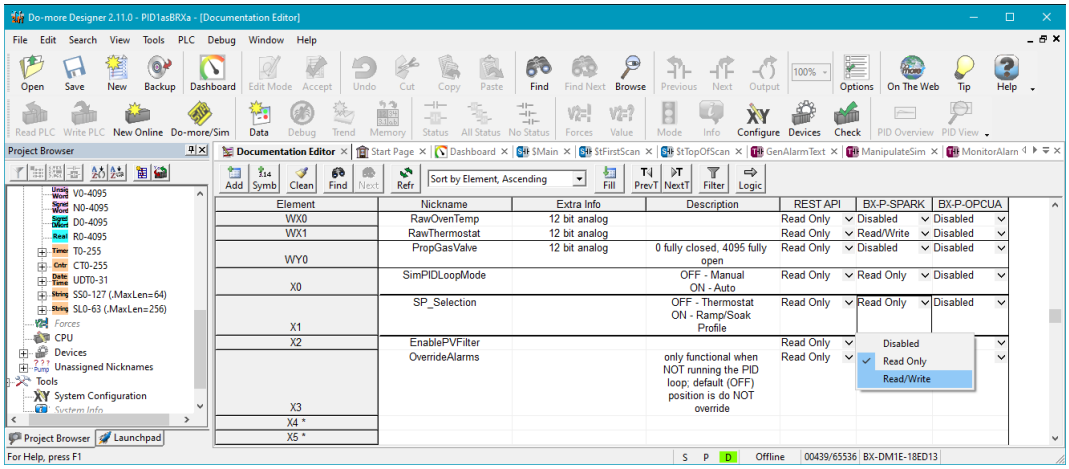
a. Configure BX-P-SPARK POM

From the **PLC->System Configuration** dialog's *CPU* entry page, hit the *[Setup POM]* button, select the *BX-P-SPARK* tab to configure the connection to your Sparkplug B MQTT Server.



b. Map Specific BRX Elements as Sparkplug B Tags

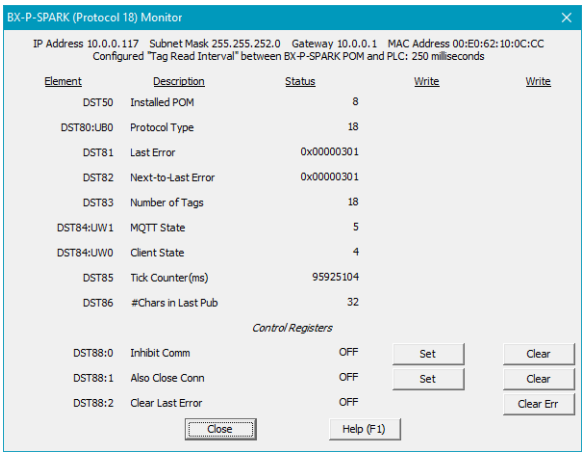
From the **Element Documentation Editor**, select the set of BRX Elements that will be available to your Sparkplug B MQTT Server. Everything is DISABLED by default.



c. Monitor the Live Status of the Sparkplug B POM

Select **Debug->Sparkplug B Monitor** menu to launch the monitor dialog. The table lists out the System DST Elements, Descriptions, and the current Status values.

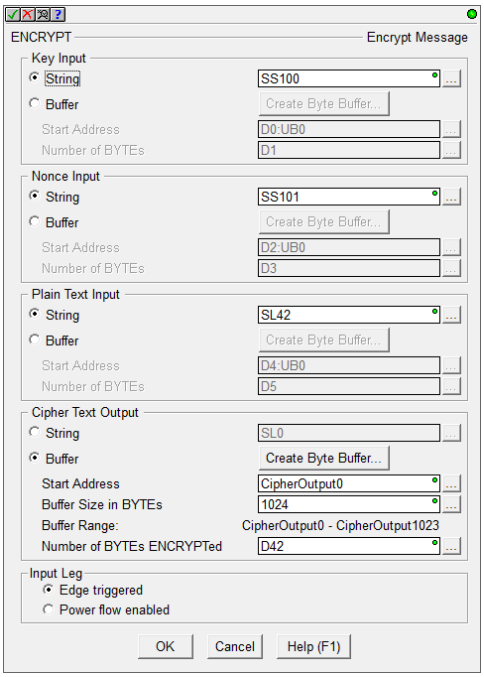
All of these System DST values are available to your PLC logic or HMI. (see the *Element* column for the specific DST IDs along with any specific casts). One of the DST's contains Control Bits for Inhibiting Communications and Resetting Error Codes.

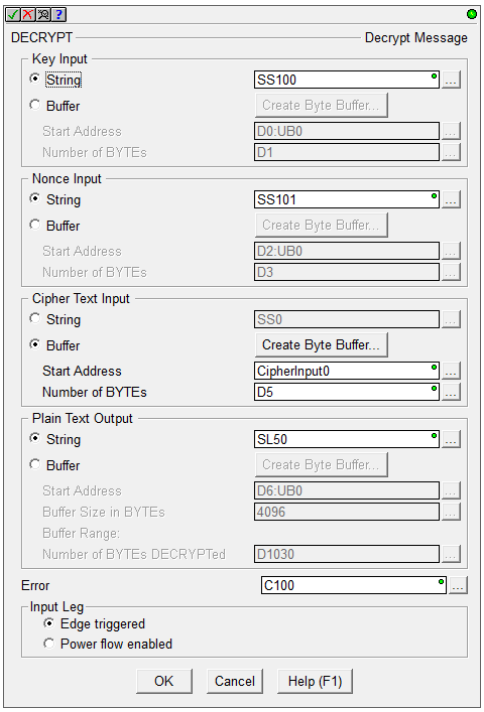


4. New Instructions *(DmT 2.11)*

a. ENCRYPT – Encrypt Message and DECRYPT – Decrypt Message (BRX and Simulator)

Utilize the **Ascon-128 Cipher encryption algorithm** to the BYTEs of a data buffer or to a string using your predefined *Private Key* and current *Nonce* as inputs. This can be useful in certain applications for enhanced custom protocol security or encrypting data file content.

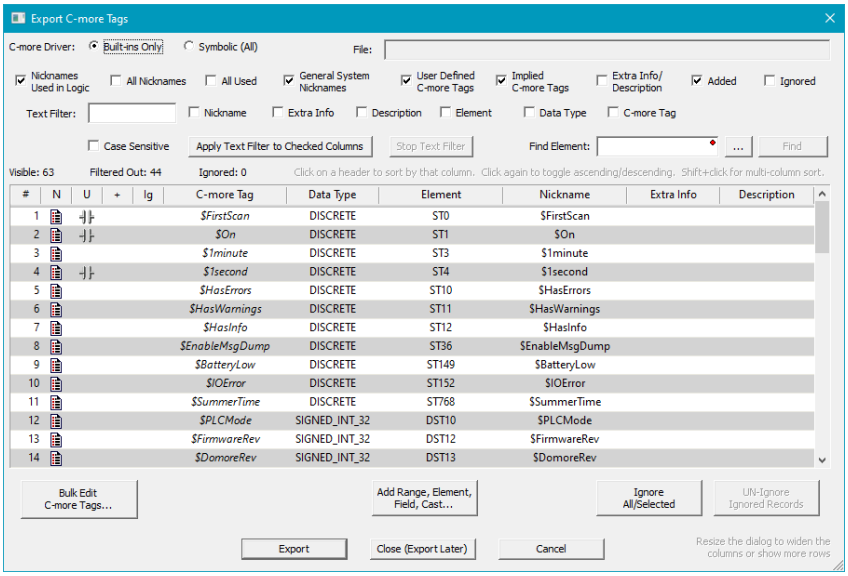




5. Enhanced C-more Tag Export Dialog

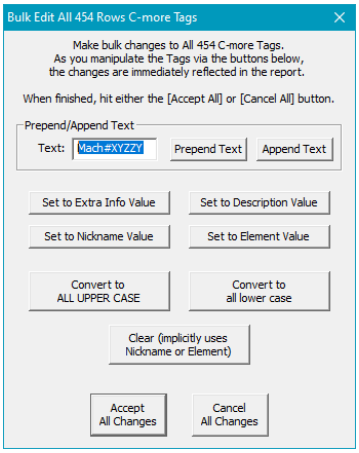
Filter in/out Used Elements, Nicknamed Elements, System Nicknames, or any combination (6+ filter groups) based on the selected C-more driver (Built-Ins vs. Symbolic).

Utilize the implied auto-generated Tag, or enter or generate C-more tags (up to 128 characters) based on other pieces of Element Documentation (Extra Info, Description), not just the Nickname.



C-more tags are no longer limited to certain Alpha-Numeric characters or length. Enter **spaces, symbols, punctuation**, whatever: `Machine #XYZZY-123 SL_ABC`, up to 128 characters. Easily add any elements to the Tag list that aren't specifically referenced in your program, like all the fields of an entire Range of a UDT Recipe data-block that is only referenced as an array.

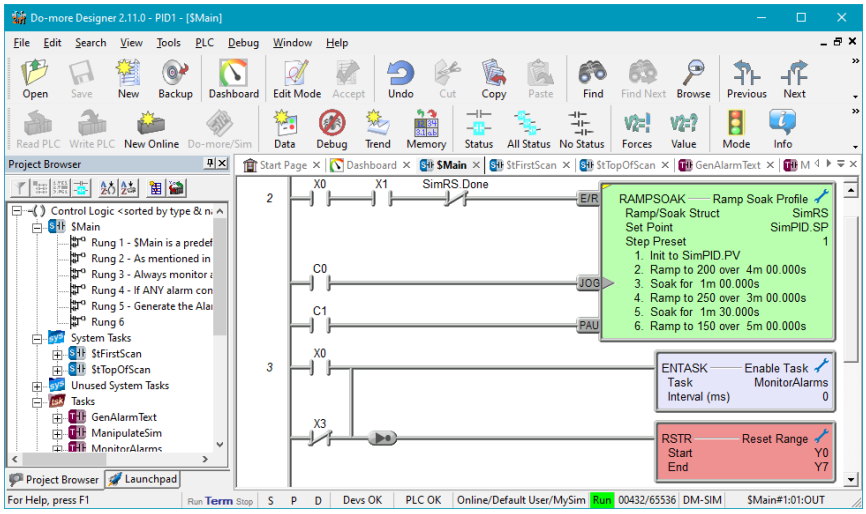
Perform **Bulk Edits / Bulk Generation of the C-more tags**. For example, prepend a Machine ID to some or all of your Tags OR generate the text for a bunch of Tags based on Element Description field, but just for the Elements that have “HMI” in the Extra Info field, etc.

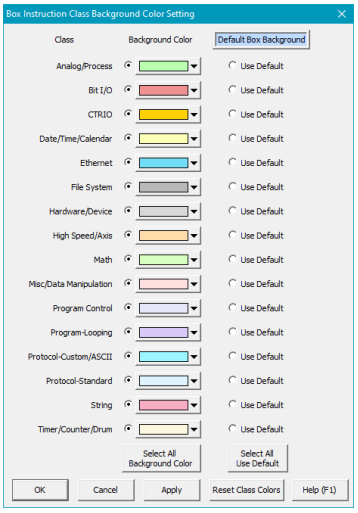


6. Features

a. Ladder View – Ladder Box Background Color by Box Class

Each Box Class group has its own predefined pastel background color to help distinguish the set of boxes in that class.





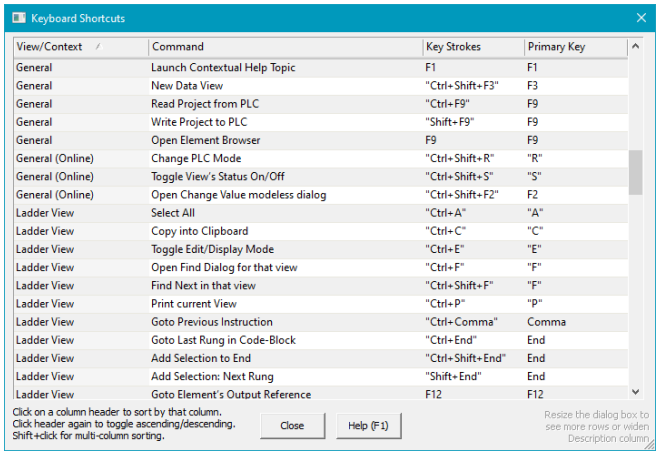
Change the colors or turn it off by right clicking on the Ladder Toolbox or in the Ladder View Options’ Display tab (Miscellaneous group box).

b. Help->Keyboard Shortcuts dialog

Lists out of ALL hot key shortcuts and what they do across ALL the various Views/Contexts.

The list is sortable by any of the columns, making it easy to discover what is available.

The dialog resizable and is modeless, meaning it can stay open while you work inside the related View or Context.



c. Create Windows Shortcuts to your favorite Designer .DMD Project Files or Communication Links

Easily launch Designer with your favorite Projects or PLC Links **just by double clicking a shortcut** on your **Desktop**. To create a Windows Shortcut, use the **File** menu *File->Create Windows Shortcut->To this Project File* or *->To this Communication Link*

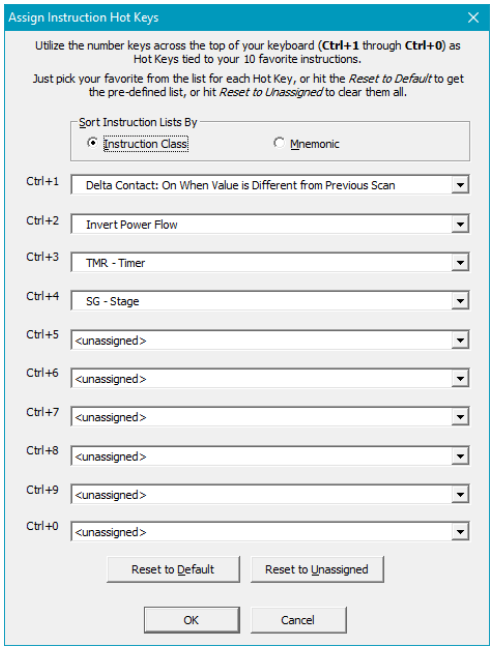
d. Ladder View – Assign Keyboard Accelerator Hot Keys to your Favorite Instructions

Assign Ctrl+1 through Ctrl+0 as hot keys to your favorite instructions for editing.

Right Click in the **Ladder Toolbox** and select *Assign Instruction Hot Keys* to configure your favorites.

Your specifically assigned hot keys will show up in the Ladder Toolbox tooltip for their corresponding instruction, and show up in the new *Keyboard Shortcuts* dialog mentioned above.

This is actually an oldie but a goodie, but was never documented here. If you've been using it, great! If not, and you prefer programming with a keyboard, try it out – your fingers will thank you.



e. Ladder View – Instruction Tools 

i. View/Modify Memory Image Region Data

Utilized by instructions that have block/range of data as an Input parameter, where that block has a Memory Image Region defined. Launch the Modify Memory Image Region Data tool by floating the mouse cursor over the instruction's Wrench icon and selecting that tool for the specific block parameter. (6989)

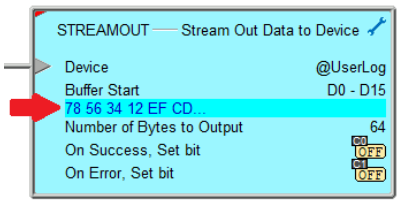
ii. Tools Menu Utilizes Vertical Spacing to Group Related Tools (6894)

f. Ladder View – Status

i. BYTE Buffer Ladder Status

Shows the status of the first 6 BYTEs in hexadecimal format of any BYTE buffer parameter.

Supported instructions: STREAMIN, STREAMOUT, PACKETIN, PACKETOUT, FILEREAD, FILEWRITE, HTTPCMD, ENCRYPT, DECRYPT.



ii. SLOPE – Pop-up Tool to Monitor in Trend View

Trace the Input and the resulting Slope parameter values in different panes.

g. Ladder View – Enhanced Mouse/Keyboard Ladder Editing (6891)

With focus on a specific Parameter in the Ladder display (block cursor on instruction and parameter focus rectangle on a specific parameter), **hitting the SPACEBAR** in Ladder Edit mode will launch that instruction's editor, with **focus placed on that Parameter's Edit Field**.

Similarly, **DOUBLE-CLICKING** on a specific Parameter in the display will launch that instruction's editor, with focus placed on that Parameter's Edit Field.

These behaviors can be changed in the Ladder View Option's dialog, Edit tab. The SPACEBAR behavior is ON by default. The DOUBLE CLICK behavior is OFF by default.

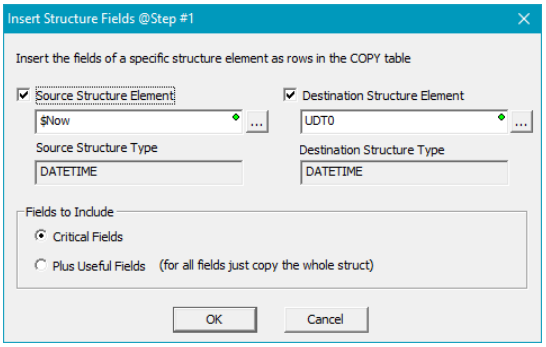
h. Ladder View – COPY Instruction

i. Added [Swap Source & Destination] button

Could be helpful when copying a large set of elements at the top of scan, then need to do the opposite at the bottom of scan. (6832, thanks to RP)

ii. Added [Insert Structure Fields] button

Generates the individual table row entries for the fields of the specified Source and/or Destination structures (2765).



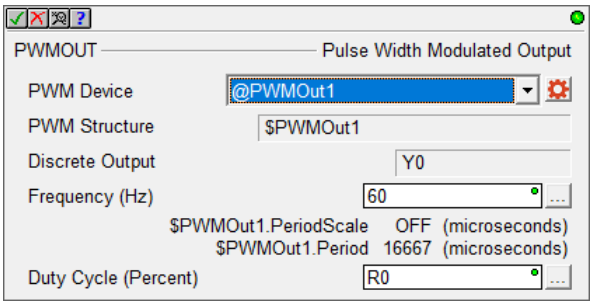
i. Ladder View – CALL Instruction Added [Copy/Swap Input Table] Button to Output Table

Useful for when the Input Parameter Table has a set of Input parameters to the Subroutine CALL, and the Output set of parameters is just the "swap" of the Input Parameter Table (6907).

j. Ladder View – PWMOUT – Pulse Width Modulation Output Instruction Editor

Added PWM Structure members *.PeriodScale* selection bit and *.Period* value based on the entered Frequency (Hz) value. The editor translates the Hz Frequency value to a milliseconds or microsecond Period value.

This shows the behavior of the PWMOUT instruction in that all it does is set those two PWM Structure members (which can also be done via simple SET/RST, MOVE instructions)



k. File->Project Options

Nickname/element mapping is written to the PLC to enhance the Symbolic Communications Driver (it supports Nicknames too, not just elements). This list can be large. Added option to **EXCLUDE Nicknames** to reduce the time to write the project to the PLC. However, the REST API, the BRX OPCUA and Sparkplug B POMs, can all be greatly affected by this option. See new Program Check rule W83 below.

l. File->Import->Memory Data, Memory View Import, Memory Image Manager Import

Properly supports CSV data files with Structures and field values; expected file format is consistent with the Memory View Export format; File-Import->Memory Data also supports entries for DIFFERENT blocks and heap items that all have the SAME SCHEMA

For example, MyUDT structure schema based blocks MyBlock0, MyBlock1, MyHeapA, MyHeapB can be entries in the same CSV import file because they are all MyUDT schemas – which is specified in the TOP line of the CSV file followed by all of the data field rows (6868).

m. Dashboard View

i. In the **local base display**, **floating** the mouse over one of the BRX Ethernet POMs shows a tooltip with detailed Ethernet **TCP/IP Addressing** information (6903), and links to any applicable **Monitor** tool (6917).

ii. In the **local base display**, **clicking** on most of the BRX POMs will pop up a menu with **helpful tools** applicable to that specific POM. If the POM has an associated device system heap-item, one menu item will monitor the **heap-item** status in a **Data View**. If it's one of the new BRX Protocol POMs, another menu item can launch the specific Protocol POM's **Debug Monitor**. Added menu item to launch **NetEdit 3** for the POMs which need NetEdit 3 to update their firmware (ECOMLT, SPARK, or OPCUA, 6291).

iii. In the **Communications Pane**, when online and where applicable, added **Monitor I/O Masters/Scanners menu** for quick launch of the Ethernet I/O Comm Monitor, EtherNet/IP Comm Monitor, and Modbus I/O Scanner Monitor.

iv. In the **Communications Pane**, when online and where applicable, added **Monitor Protocols menu** for quick launch of the OPC UA POM Monitor, Sparkplug B POM Monitor, and Do-more Logger application.

v. added more ways to launch NetEdit 3, which is needed in order to update firmware for certain BRX POMs. Just click on the

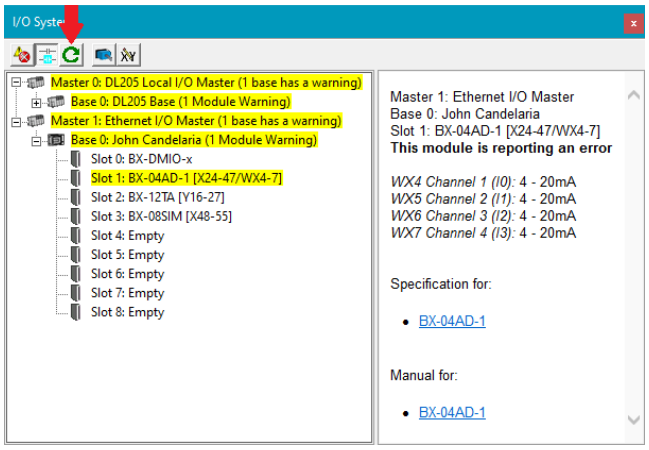
n. System Configuration – Setup POM Dialog

When Online to a PLC, the Setup BRX POM dialog defaults to the currently installed POM (if one is currently plugged in) (6901).

o. I/O System View – Refresh Ethernet Bases' Status Button 

The Ethernet I/O Bases' Status reads are actually done in the background by the PLC, not directly by Designer. When requested by Designer, the PLC then requests the status of up to 16 Bases as part of its Ethernet I/O cycle.

Hence, the high-level request by Designer to *Read Bases' Status* in the I/O System View is now done explicitly/foreground via the new **Refresh** button on its toolbar, next to the Status ON/OFF sticky button.



p. Project Browser – Control Logic Tree
Added *Open Debug View* to those tree items' right click context menu.

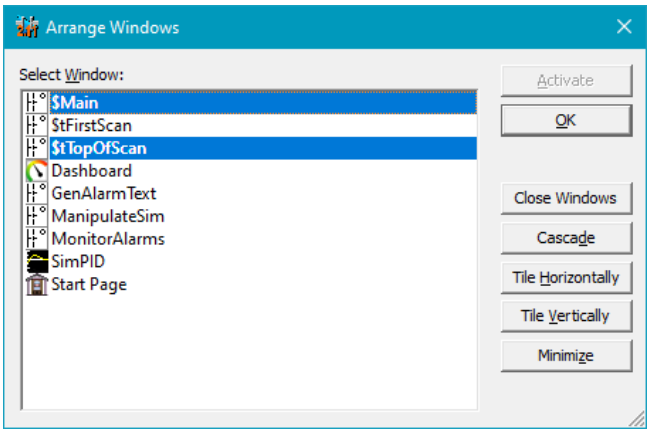
q. Arrange Windows Dialog

Easily Tile, Cascade. Minimize, Close, Activate any set of primary MDI Child Windows (6840).

Tiling Vertically is great when needing to **read or do status on multiple Ladder Code Blocks** side-by-side.

Tiling Horizontally is great when needing to **synchronize the timelines of multiple PID and/or Trend Views** status traces.

(see *Windows->Arrange Windows…* menu)



r. Data View – **Copy Status to Clipboard** added to right-click context menu (6918); **Ctrl+V Paste supported** within Edit column's text editors (6919) (thanks to GD).

s. Memory View – Added support for **BINARY** format display/editing for Integer Data Blocks (6896); when going offline, views remain open and disk project workspace maintains their window layout when re-opening disk project, regardless of PLC connection (6493).

t. EtherNet/IP Scanner – Added **19 new** Adapter products from 9 different vendors to the Electronic Data Sheet (EDS) Profile library (new RFID, Cameras, Sensors, I/O Link, PLCs, Drives, Soft Starters, …). Hit the **Add Adapter with EDS** button in the *System Configuration's EtherNet/IP Scanner* page to see the hierarchy of pre-installed and imported Adapters (you can always import your favorite 3rd party products' EDS files to the library).

u. Enhanced Implicit Extra Info Text for I/O

By default, Discrete and Analog I/O show the Master/Base/Slot and Point/Channel number in the Extra Info field when the user has not entered any Extra Info documentation for that specific X, Y, WX, WY, RX, RY element.

The Extra Info text now includes Analog Scaling and High Speed I/O configuration information via a character value replacing the normal space character between the Master and Slot (5688):

WX/WY **`*`** when scaled (WY1: Local*S0:oCH2)
RX/RY **`*`** when scaled (RY1: Local*S0:oCH2), ? when not scaled (RY0: Local?S0:oCH1)
X: **`c`** High Speed Counter (X0: LocalcS0:iPT0), **`t`** Timer (X4: LocaltS0:iPT4), **`p`** Pulse Catch (X5:LocalpS0:iPT5), **`m`** Multiple (X1: LocalmS0:iPT1)
Y: **`A`** Axis (Y0: LocalAS0:oPT0), **`P`** Pulse Width Modulation (Y2: LocalPS0:oPT2), **`T`** Table Driven Output (programmable limit switch, Y3: LocalTS0:oPT3)

v. New System Status Nicknames

DST80	$POMProtoInfo0
DST81	$POMProtoInfo1
DST82	$POMProtoInfo2
DST83	$POMProtoInfo3
DST84	$POMProtoInfo4
DST85	$POMProtoInfo5
DST86	$POMProtoInfo5
DST87	$POMProtoInfo7
DST88	$POMProtoInfo8
DST89	$POMProtoInfo9

POM Protocol Information and Control Registers that are specific to each Communication POM Protocol module, like BX-P-SPARK and BX-P-OPCUA.

For specific details of these DST registers based on the specific Protocol POM, see Help Topic *DMD0547 Protocol POM Monitors*.

w. New Program Check Rules

i. **M87 UDP Device w/o PACKETIN instruction (possible packet buffer resource issue)** The low-level Ethernet port has a fixed number of incoming pending packet buffers for all ports/services. These buffers are expected to be processed by the PLC firmware for each specific port/service. If an Ethernet packet shows up on your network on a specific UDP port that matches the PLC's UDP Connection UDP Port number, targeting the PLC's IP Address **or is (worse) a broadcast packet**, but without a PACKETIN instruction to process it, these buffer resources will be utilized but never freed, eventually affecting all incoming Ethernet traffic. Double-clicking on this rule provides some helpful diagnostics when online to the PLC (6858).

ii. **W86 Installed ECOMEX POM Gateway Address conflicts with On-Board Gateway Address** (6914).

iii. **W85 Installed ECOMEX IP Address is on same Subnet as On-Board IP Address** (6915).

iv. **W84 Installed POM Missing Configuration**

v. **W83 Nickname table not populated in PLC; service cannot lookup Nicknames** will be issued when you have the File->Project Options to EXCLUDE Nickname support for the Symbolic Driver, but also have one of these services enabled or configured: REST API, Protocol POM (BX-P-OPCUA or BX-P-SPARK).

7. Adjusted Anomalies

a. Ladder View - better error messages when doing status on STRINGs; does not do status on hidden temporary string, bits, and numeric parameters; Instruction Tools (wrench) Memory View should not show up offline (6894); widened RAMPSOAK instruction when Status is ON to eliminate ellipsis on clipped status text (6890); COPY/CALL instruction editors provide better detail in their error messages (6905); Common Timer editor no longer affects display of actual Timer instructions (6923); Common Timer editor displays proper timing diagram for the TMRADOWN timer option (6931); Rung Comment Editor properly handles non-Medium default text size (6929);

b. **System Configuration** – EtherNet/IP Scanner Adapter's EDS File Processing added modal Operation Status Dialog for better handling when reading large EDS files; Implied Adapter Assembly Length in EDS file is properly handled; Expanded EtherNet/IP Scanner Generic Adapter's I/O maximum assembly size from 400 to 504 BYTEs; Setup POM dialog [Help] button or F1 (Help) key launches the Help topic for the currently selected POM;

c. **Trend/PID View -** widened Period slider on toolbar so detents are more obvious (6889, thanks to KH);

d. **File->Import->Memory Data, Memory View Import, Memory Image Manager Import** – properly IMPORTs CSV double double-quote escape sequences for STRING elements and structure fields; this CSV format has always been done by Designer's Data Export facilities, as required by Excel and other CSV import mechanisms (6902);

e. **Cross Reference View** – ranged entries refresh on a Block Name change (6875);

f. **EtherNet/IP Scanner Monitor Dialog** – properly close when disconnecting from the PLC (6877).

g. **Offline Setup** – changing from Simulator to 205 works properly (6749, 6911); properly sets the project's Modified (Write to Disk) state (6925)

h. **Output Window** – maintains floating position after performing *Save to Disk* (6722).

i. **Window->Default Layout** – restores floating windows to same window as application.

j. **I/O System View** – stabilize background communications (Read I/O Configuration, 6829).

k. **PID Overview View** – context menu properly supports all the secondary PID instruction Cross Reference links (RAMPSOAK, ALRATE, ALDEV, SCALE, 6878)

l. Modbus I/O Scanner – adjusted terminology for consistency throughout various dialog boxes: high level function is *Modbus I/O Scanner,* the Modbus slave devices it controls are *Modbus Scanner I/O Devices*; added new version of the **Socomec Power Monitor** profile (Socomec Diris V1_2.mdp) that properly performs WORD SWAP on the various 32 bit signed integer Modbus Holding Register parameters (thanks to GSK).

m. **Memory Image Manager** – when connecting to a PLC with a disk project with Memory Image Regions, provide better options on how to synchronize data in the PLC with data on disk; re-labeled Memory Image Manager Modify Region Data button to *Modify/View/Import/Export Region Data* (6608, 6692 thanks to MF).

n. **IP Settings Dialog and SETUPIP Instruction Editor** – warn when Subnet Mask is invalid; warn when Gateway IP Address does not fall on PLC's configured IP Address's subnet (6924).

o. **Project Browser** – do not allow editing of rung comments unless in Edit Mode.

p. **File->Write to Project to PLC** – Nicknames stored for the Symbolic Driver maintain case.

q. **Communication Server** – at launch of Designer, properly display Communication Server error dialog for bad Communication Links whose Communication device is now missing from the PC (e.g. COM9 USB to Serial cable that is no longer connected to the PC); better handling of unstable VPN connection or USB to Ethernet Adapter removal since these situations can cause the PC's Ethernet Adapter device to disappear, also offer to Disconnect/(Re)Connect if the *PLC->Re-open Session* fails (5875, 6926, thanks to GD).

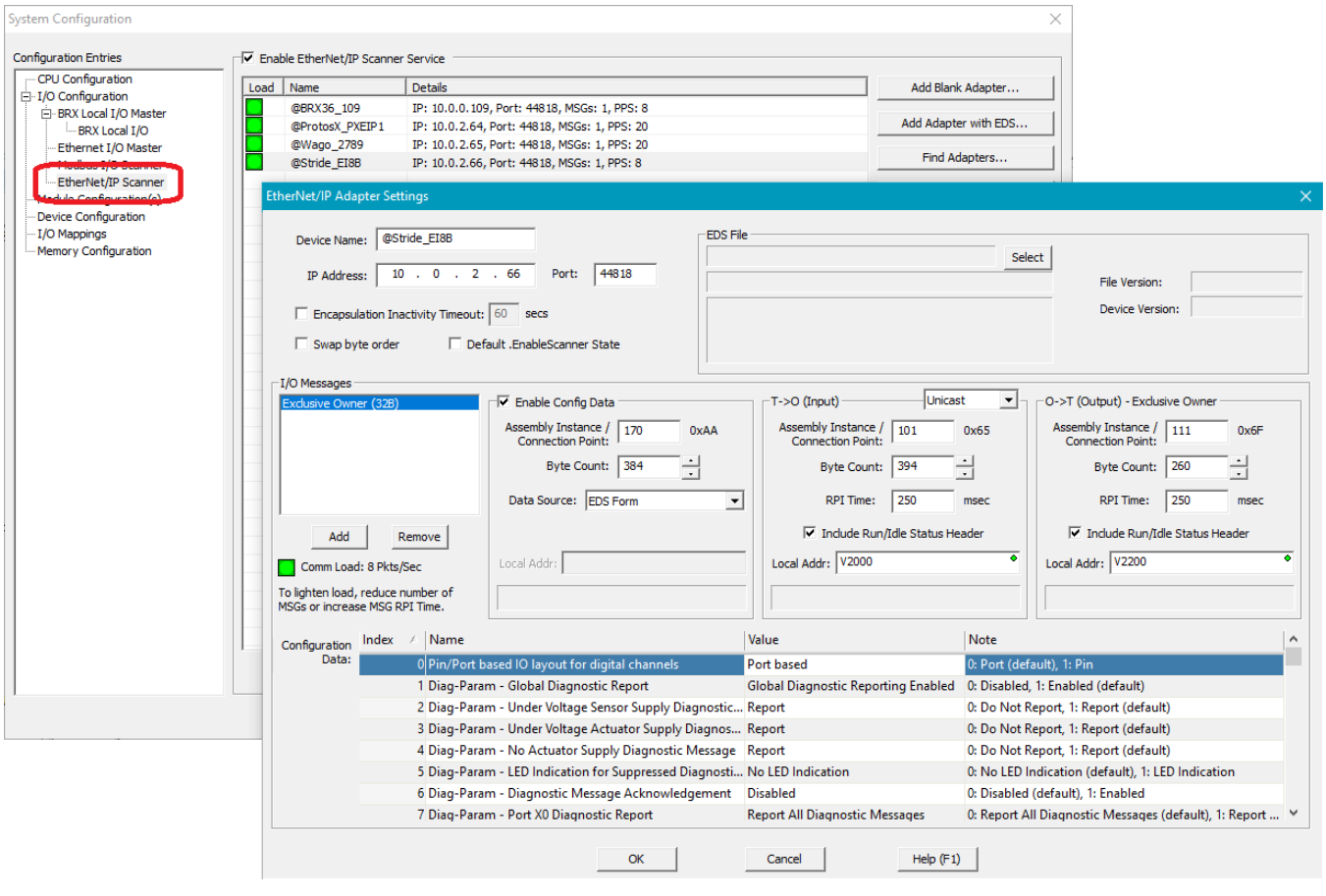
1. EtherNet/IP Implicit Scanner

(requires Do-more Technology Version 2.10, BRX and Simulator only)

Finishing out the EtherNet/IP set of Explicit and Implicit messaging support, BRX Do-more PLCs are now capable of performing **Implicit Scanner** to **up to 32 I/O Adapter devices**. **Import the 3rd party vendor's .EDS file** and choose from their various Connections to map their T->O and O->T packet contents to Do-more Memory, along with entering any required Configuration parameters.

You can even create an **EDS Assembly-Specific User Data Type** and **map the Assembly's named parameters to your named structure fields**. Create that specific Device's Assembly as a single Heap-Item, or even create a block of the UDTs when you have multiple instances of the same EtherNet/IP device to leverage array referencing. Your Do-more UDT data will automagically be updated by the EtherNet/IP Adapter's specific T->O and O->T I/O cycles.

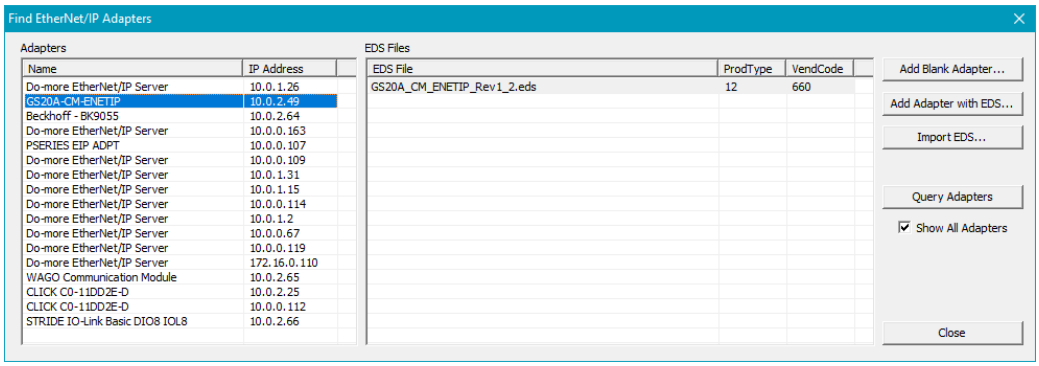
From the *PLC->System Configuration* dialog, just select the *EtherNet/IP Scanner* option below the *I/O Configuration* Entry, and check the *Enable EtherNet/IP Scanner Service* to get started.



You can also access the EtherNet/IP Scanner configuration via the **Dashboard's I/O Panel** in the top right.

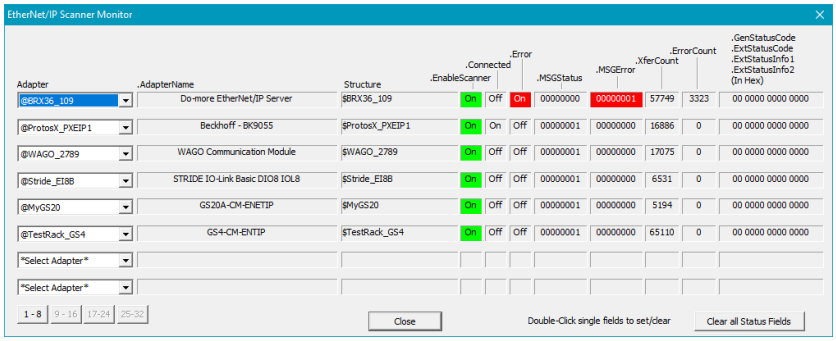
a. **Find EtherNet/IP Adapters** (“NetEdit” functionality for EtherNet/IP Adapters)

Just hit the **Find Adapters… button** on the EtherNet/IP Scanner page of the System Configuration to have your PLC **query its network** for any existing EtherNet/IP Adapter devices. Pick and choose any of the devices to add them to your Scanner. Utilize their EDS file if it already exists in Designer’s Profile Repository, or Import any third party EDS files into the repository. EDS files greatly help with configuring that specific Adapter.



b. **EtherNet/IP Scanner Monitor**

When online, monitor the status of all your EtherNet/IP Scanner’s Adapter devices via the *Debug->EtherNet/IP Scanner Monitor* menu.



Double-click on **any field** of any Adapter to Enable or Disable the I/O cycles of individual Adapters, or Clear/Reset errors/metrics.

Utilize these EIP_ADAPTER structure/members in Ladder Logic for Protocol level monitoring and control common to every Adapter.

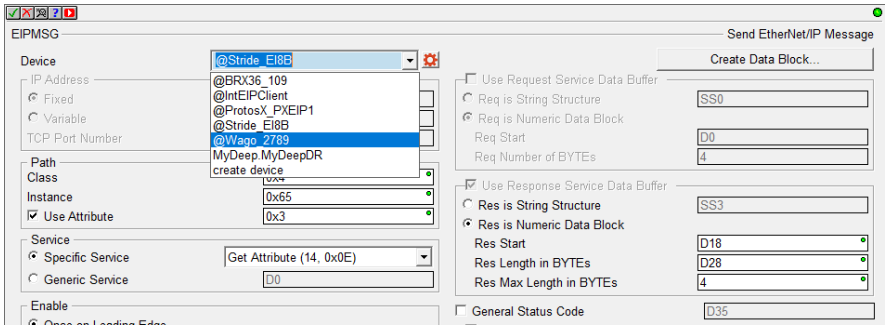
c. **EDS Repository**

A set of EDS files are initially installed with Designer. These can be utilized to help configure your Adapter devices. **Third Party EDS files can be Imported** into Do-more Designer’s Repository from the various Configuration dialogs. The critical portions of the Project’s EDS files are **included as part of your Project when written to your PLC**. This way, you do not have to have a full Repository when connecting to your PLC from a different computer.

The EDS Repository Folder is located below the *Do-more\Profiles* folder below *Public Documents* (`C:\Users\Public\Documents\Do-more\Profiles\EDS`).

d. **Support for Explicit Messaging to Adapter Devices**

You can also transact any needed Explicit Message requests with any of the Adapters using the existing *EIPMSG - Send EtherNet/IP Message* instruction.

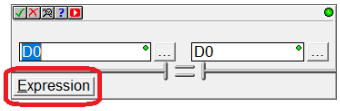


2. New Instructions *(DmT 2.10)*

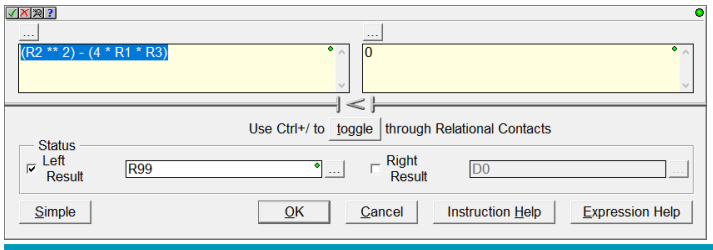
a. **Expression Relational Contacts** (6792)

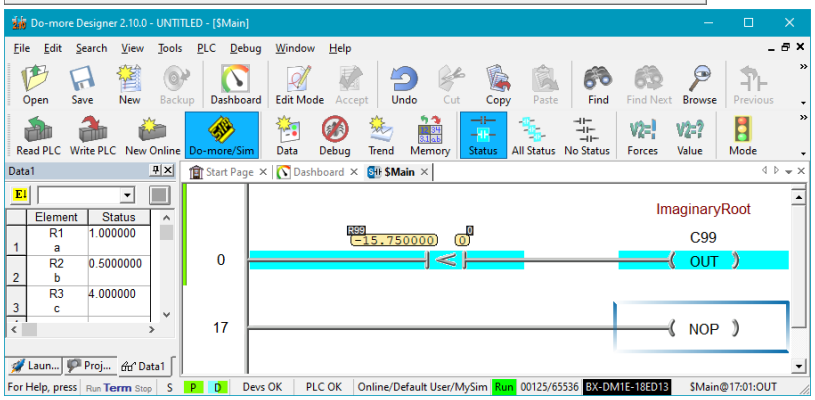
Enter full MATH-like expressions for both the Left and Right side of the Relational Contact, even utilize complex array index expressions like `R[((V0 + 3) * 10) + V1]`.

When entering a normal relational contact, just hit the Expression button to enter expressions for both Left & Right side of the relational contact.



To help with Value Status, enter an optional Result parameter for each side, showing each side's expression result value in the Ladder Status (contact cyan ON/OFF status is always provided).





The Result parameters can also eliminate the need for a MATH box if the Result is needed for other logic.

In this example, R99 is the Quadratic Formula "root" term (b^2-4ac).

b. New MATH real-result functions **MROUND**, **FLOOR**, **CEILING**

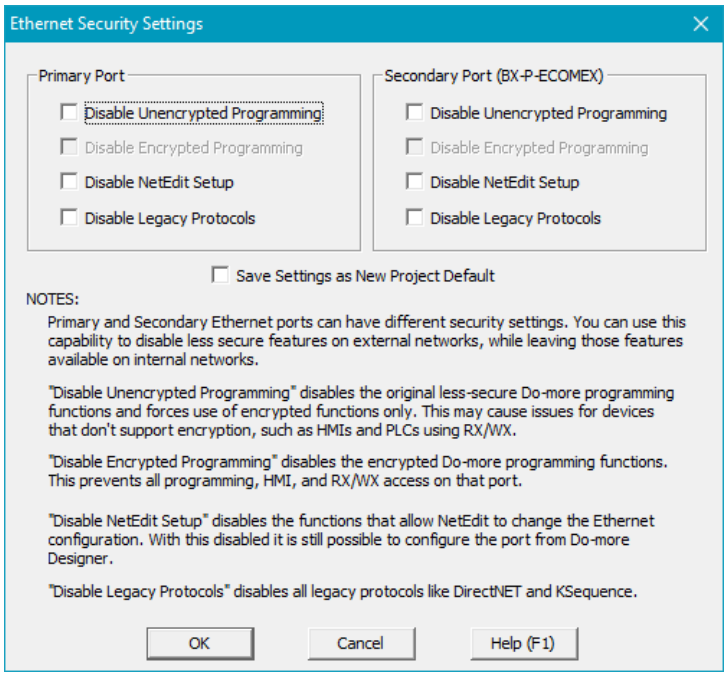
   i. MROUND(*number*, *multiple*) – rounds *number* expression up or down to the desired *multiple* expression. Examples:
   MROUND(5.1, 2) rounds 5.1 to nearest multiple of 2 (result 6.0)
   MROUND(4.9, 2) rounds 4.9 to nearest multiple of 2 (result 4.0)
   MROUND(3.14159, 0.001) rounds 3.14159 to nearest multiple of 0.001 (result 3.142)
   Note: New MROUND is different than existing ROUND(*number*) function, which always rounds to nearest whole real number.

   ii. FLOOR(*number*, *significance*) – rounds *number* expression down (towards 0) to the nearest multiple of *significance* expression. Examples:
   FLOOR(5.7, 2) rounds 5.7 down to multiple of 2 (result 4.0)
   FLOOR(1.58, 0.1) rounds 1.58 down to multiple of 0.1 (result 1.5)

   iii. CEILING(*number*, *significance*) – rounds *number* expression up (away from 0) to the nearest multiple of *significance* expression. Examples:
   CEILING(5.1, 2) rounds 5.1 up to multiple of 2 (result 6.0)
   CEILING(1.21, 0.1) rounds 1.21 up to multiple of 0.1 (result 1.3)

3. **(2.10.2) Secure Ethernet Do-more Protocol Communications (BRX only, requires 2.10.2 firmware and Booter 1.1.2/Gate Array 1.17)**

   Each BRX PLC Project can specify whether or not the PLC will require/allow **Encrypted or Unencrypted Do-more Protocol** communications over Ethernet via BRX Primary Ethernet port and the BX-P-ECOMEX POM Secondary Ethernet port (see PLC->System Configuration… **Internal Ethernet Port Security button**), along with disabling other Ethernet-based protocols:



These settings do NOT affect Serial or USB communication link connections. Those are always un-encrypted. See new System Nickname $EthSecrtyPolicy below for current settings report accessible from logic.

Online Link Status Bar	*Description*
	Designer will show a LOCKED icon as part of the Communication Link Status Bar Pane when the connection's protocol session is currently using encryption.
	The pane will show an UNLOCKED icon when connection is currently using UNencrypted communication but the PLC is configured for using ENCRYPTED over one or both the Ethernet ports. This can happen when the current session's communication link is over Serial, USB, or the "other" un-encrypted Ethernet port.

The pane will NOT show any icon when doing un-encrypted communication if BOTH Ethernet ports allow UNENCRYPTED programming (pre-2.10.2 behavior).

The PLC's Ethernet Security settings could affect Do-more Designer Programming, C-more HMI, and remote RX/WX Network Read/Write Peer to Peer instructions. These are all potential Do-more Protocol clients talking to your BRX PLC over Ethernet.

4. Enhancements

a. **Security** – *(DmT 2.10)* **Expanded password lengths** for

   i. System Configuration SMTP (Email) user accounts to **63 characters**.

   ii. PLC User accounts to 32 characters; this also requires the BACKUP and RX/WX instructions to support longer passwords for their Password parameters.

b. **Project Files** – when opening and using .dmd project files within a Designer session, Designer now expands the compound files contained within the .dmd file to be below the **user's local %temp% folder** instead of below the .dmd project file's folder "temp". Switching to the local user's %temp% folder minimizes issues compared to when the project's subfiles were being accessed via a network drive or a virtual drive in the cloud (6839, thanks to GL et.al.).

c. **Ladder View** – **Options**, divided options into two tabbed dialog groups, Display/Status and Editor/Mouse.

d. **Ladder View** – Instruction Editor Element field **width expanded** since Element names are capable of being very long. See the Ladder Options/Editor tab to configure this - range is 16 to 48 characters (default is now 24).

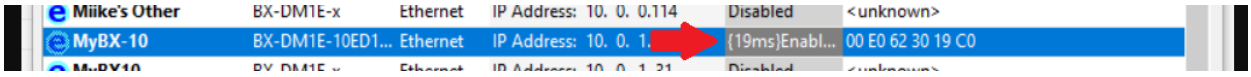
e. **System Configuration – Memory Configuration – User Data Type** – added option to **minimize "nag" dialogs** when editing UDTs that have unions or unused DWORDs (6756, thanks to RB).

f. **System Configuration – I/O Configuration – EtherNet/IP Scanner – Create Assembly Specific UDT dialog (2.10.2) –** added **Generate Field Names button** that auto-generates initial 16 character UDT field names for all the currently unnamed fields based on the **EDS parameter descriptions** of that Assembly. Note that some vendor's EDS file's parameter descriptions are more appropriate/compatible as field names, so actual milage may vary.

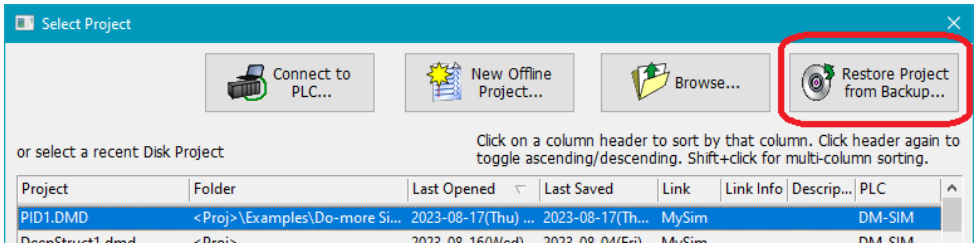
g. **System Configuration – Memory Configuration – EtherNet/IP Adapter Structure (2.10.2)** – added two new fields UNSIGNED BYTE **.MSGSent** and UNSIGNED BYTE **.MSGReceived**. The 8 bits within those BYTEs represent the MSG#(minus 1). So .MSGSent bit 0 turns ON whenever MSG 1 T->O is Sent. .MSGReceived bit 7 turns ON whenever MSG 8 O->T is Received. Your program is responsible for CLEARing those bits.

h. **New Offline Project Dialog** – in the Specification List window, bumped the supported Expansion Module count for the **BX-10 and BX-18 MPUs from 2 to "up to 8 modules"** (still limited based on power budget, 6789).

i. **Select PLC Connection Dialog** – to help with setting **Timeout values for remote connections**, hitting the Blink & Refesh  button for the selected Connection will **report** the communication **turn-around time** in the Enable column.



j. **Select Project** dialog – added **Restore Project from Backup** button. Added **Configure Autosave** button to Restore from Backup dialog. Backups are automagically saved in addition to any explicitly Backed Up Projects.

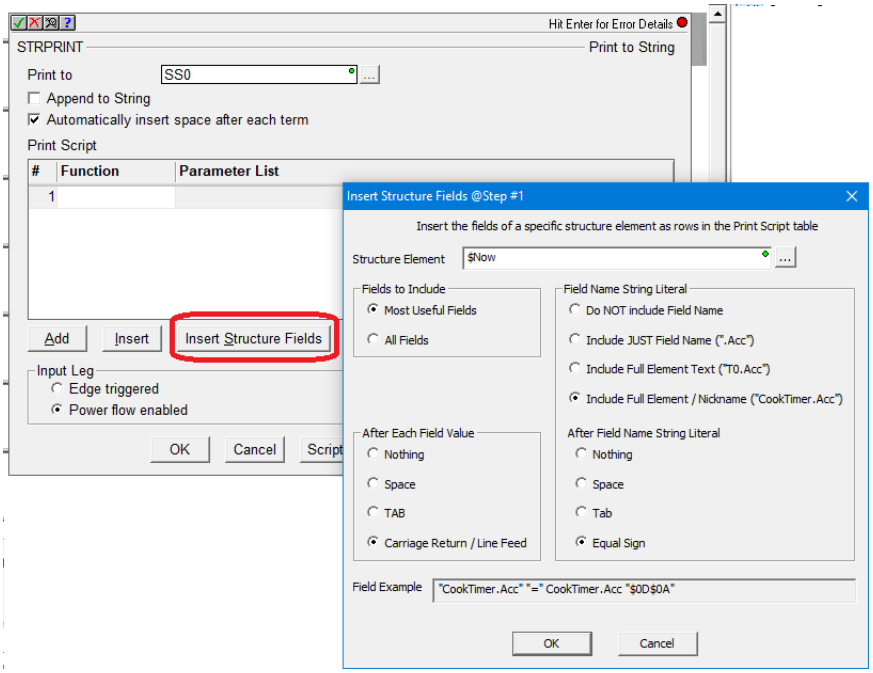


k. **Ladder View** – Allow **ranged Math functions** to support a block range of a specific **field of a User Data Type/Structure**. Say you have a BatchLog data block that records temperatures in a REAL field called .Temperature. You can now call AVGR (Average over a Range) inside a MATH Expression parameter with the BatchLog's .Temperature field:

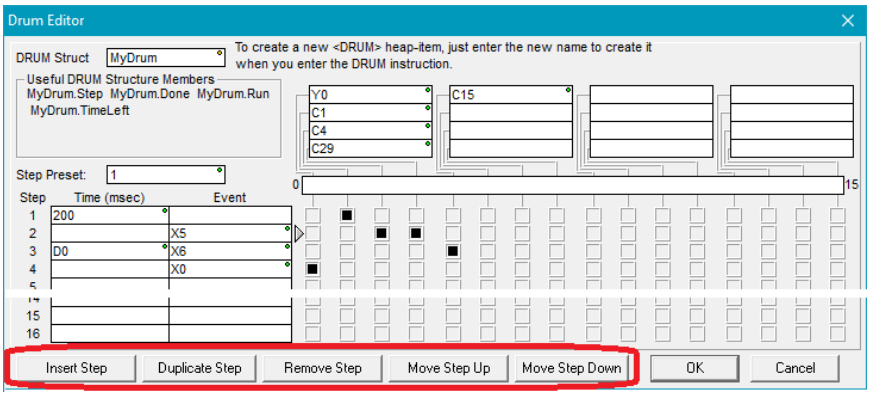
```
AVGR(BatchLog0.Temperature, nBatches)
```

This enhancement applies to the following Math functions: AVGR, MAXR, MINR, STDEVR, STDEVPR, SUMR, and all the SUMIF* and COUNTIF* functions (6865, thanks to RA; requires *DmT 2.10*).

l. **Ladder View** – **STRPRINT, EMAIL, DMLOGGER Script Editor** to easily add all/most of the fields of structure elements to the print script (6765):



m. **Ladder View** – **Drum Editor** added **Step helper** buttons to Insert, Duplicate, Remove, Move Up, and Move Down to manipulate entire Step Row (6800):



n. **Ladder View** – For PROGRAM code-blocks with Stages, show the status of the rungs containing stage bit in the rung Address area. Also show the TASK or PROGRAM's .RanThisScan in the Address area. This can help show the user if the logic in that rung is actually being scanned (5960). Note that some rungs may only execute for 1 scan by design, so that Rung's Address area status may not reveal that short of an event.

o. **Ladder View** – Instruction Editor default Output Parameters on new instructions utilize the Element Picker's "Consider Unused elements with Nicknames as 'Used' " behavior when it's checked (6602, thanks to RB).

p. **Ladder View** – **HWINFO – Get Hardware Information** – added queries for module's I/O starting address mappings of any X, Y, WX, and WY points.

q. **Ladder View – MWX – Modbus Write** – allows writing a constant value beyond just 1 or 2 registers, now allows a variable number or more than 2 registers, zero pads beyond 2 (DM655).

r. **Ladder View – MRX/MWX – Modbus Read/Write** – support reading and writing a single structure via Modbus. The 16 bit Register Count must match the structure length exactly, so a UDT structure 5 DWORDs long would require a Modbus Register count of 10 WORDs. Heap-items and nested structures are also supported by this feature.

s. **Ladder View** – **Print** – Added an option for large Tall/Wide Split rungs to start on a New Page so that there is better chance that large rung could fit on a single page (6835).

t. **Ladder View** – **EIPMSG – Send EtherNet/IP (Explicit) Message** does not require the IP Address or Ethernet Port value when the device is an **Ethernet/IP Adapter** device since those values are implied by the device's configuration. Those values from the System Configuration will show up as read-only parameters in the editor, and also displayed in the Ladder View.

u. **Ladder View – DEVREAD – Read Device Register (2.10.2)** – added 16 new Register types for **Ethernet/IP Scanner Adapter** devices to read the **Requested Packet Interval RPI** (in milliseconds) for each of the 8 T->O MSGs and the 8 O->T MSGs.

v. **Project Browser, Element Picker** – added configured maximum string length for all STRING elements (e.g. SS0-SS127 .MaxLen=64). The Project Browser behavior can be disabled in its *Options* dialog (enabled by default).

w. **Data View** – added support for Symbolic Constants (useful when generating Data View content from Instruction Monitor Parameters or to/from Trend View; 6751, thanks to GD).

x. **Data View** and **User Data Type Field Configuration** – changed structure field status detail terminology from *Short vs. Long* to *Critical vs. Useful*.

y. **Change Value dialog (2.10.2)** – updated read/write PLC buttons (6862).

z. **Trend View** – start left edge time tick mark on whole second (6795, thanks to CG).

aa. **Trend View, Archive** – .trarc file contains trend elements' nicknames (6760, thanks to RB).

bb. **Memory View – Structure Blocks** – added **Auto-Fit button**  to view's toolbar that sets each fields' column width based on the widest displayed content for that column.

cc. **Memory View – Structure Blocks** – added **Write Specific Fields button**  to view's toolbar to pick a set of fields and then write all the fields' values of the chosen columns to the PLC. When doing a Write Entire View of a Structure Block, if its layout contains *unioned* fields (fields that overlap in the memory layout), the Write Specific Fields dialog will pop up to prompt for which unioned field values has precedence (both cannot be written because *last one wins*).

dd. **Memory View – Structure Blocks** – changed **terminology** when selecting of number of columns within the combo-box from *Short/Long/All* to *Critical/Useful/All* based on the Structure/UDT's fields' Data View Detail settings.

ee. **Memory View – Structure Blocks** – **import** and **export** Structure/UDT field values to Comma Separated Variable (csv) text file (6692, thanks to MF).

ff. **Memory View** – Added support for **polling** STRING blocks with string Maximum Length smaller than 252 characters (and any structure block whose element is smaller than 256 characters).

gg. **Memory View** – Added String Block element's Max String Length to **Title Bar**; abbreviated **pane tab** text but its tooltip expands to full title description; report error condition in the **Status Bar** when floating mouse cursor over a cell with an invalid entry.

hh. **Video Browser Dialog** – dialog is modeless, allowing you to do other Designer work while keeping it opened (6759).

ii. **Cross Reference View** – added support for sparse ranges (like JSONBUILD structure field range, 6694).

jj. **New System Status Nicknames**

DST71	$POMMACAddress	Lower 4 BYTEs of Ethernet co-processor POM MAC address (Little Endian; first two bytes of 6 byte MAC are always 00:E0:xx:xx:xx:xx; requires DmT 2.10)
DST72	$EthPacketsFree	Ethernet stack resource "down/up" counter
DST73	$EthSecrtyPolicy	Bit-mask of the current Ethernet Security Policy settings (2.10.2, see Help Topic DM0208 System Nicknames details)
DST414	$CryptoAuthErr	Do-more Encrypted Protocol Server counter when PLC received a packet that failed Decryption or Authentication (2.10.2)
DST415	$CryptoTokenErr	Do-more Encrypted Protocol Server counter when PLC received a packet with an invalid Token (2.10.2)

kk. **Communication Server** – added **Cancel button** to Link/Connection Sensing startup dialog (6844).

ll. **Memory Image Manager** – Warn when a Region's User Data Type is going to be edited in the Memory Configuration dialog. The Region may become invalid with any type of data type or memory layout change. The Region Memory Editor now supports Export/Import of structure field values. When UDT changes are about to be committed, prompt to export the affected Regions' data to a .CSV file so the field values can be tweaked and later imported back into the Memory Image Manager Region (6869).

mm. **Device View** and **Device List View** – Show the device's Heap Item (if it exists). When online, also show the Heap Item's status in the Device View (4124). Improved landscape vs. portrait layout handling for Device View. Removed support for Status in Device List View due to complexity of requests with the Communication Server.

nn. **Web Server HTTP Header Support** (*DmT 2.10, BRX & Simulator only*) – set any HTTP Header text that gets returned as part of any response to an HTTP request from a remote client to the PLC's Web Server. After enabling the *HTTP Web Server* option on the *CPU Configuration* panel of the *System Configuration* dialog, check the *Enable User HTTPHeaders* checkbox in the *HTTP Server Settings* dialog box. Then set the **HTTPHeaders** STRING heap-item in the PLC to the desired header text (STRPRINT instruction, Data View, et.al.; thanks to GD).

oo. **Project Export/Import and Clipboard Contents** – added support for the new EDS File database in a new SYS_CONFIG2 file section.

pp. **Compare Programs dialog (2.10.2)** – when comparing against a different project file, remember that file name by default so it does not have to be Browsed to again (6852, thanks to DS).

qq. **Program Check – New Rules**

i. M133 Information Message – Relational Contact mismatched data types/value ranges (6379, disabled by default at Project Level 6799).

ii. M134 Information Message - Relational Contact equality comparison between two REALs may not be accurate (6379, disabled by default at Project Level 6799).

iii. W462 Warning - OUT coil used in edge-enabled Task code-block. Since Edge Triggered Tasks always terminate immediately, and OUT coils turn OFF when "terminated", a SET may be more appropriate (6679).

iv. W088 Warning - Memory Image Region(s) inconsistent with System Configuration. Disk Project based Memory Image Region values are not automatically truncated when modifying the Memory Configuration where the corresponding Data Block's Number of Elements is reduced. When the actual Data Block size is smaller than the stored Memory Image Region, this rule violation is posted (6816).

v. E089 Error - Disconnected Module Configuration is referenced by the System Configuration where it MUST be connected (e.g. Modbus I/O Scanner utilizing a serial port on a disconnected BX-SERIO module configured as a Modbus/RTU Slave, 6775, thanks to AS).

rr. **DmLoader** – changed default Ethernet timeout from 100ms to 300ms.

5. Adjusted Anomalies

a. Ladder View – Readonly Parameters in High Speed I/O Hardware based instructions (PWMOUT, HSCNT, HSEDGE, HSPULSEC) properly updated I/O references when changing High Speed I/O Resources in System Configuration, changes properly reflected in Cross Reference View also (6630); DRUM Mask properly reports as a Ranged parameter (6766); DRUM Instruction Editor – show Useful Drum Fields (6778); Instruction Editor – properly handle creating new Stage box when specifying duplicate Stage Bit elements for On Success/On Error JMP to Stage; FILEOPEN Instruction Editor File Handle field editor supports nested File Handle structures (6699); GSREGWR instruction only available on PLCs with Ethernet ports; Paste – properly restores focus (6784); Print – properly print multiple input boxes when they cross pages (6785, 6786); Print – properly paginate with split rungs and rung comments (6837) and other print anomalies (6842); Replace – properly handle Replace in HWCONFIG instruction (6769); Find Instruction – show entire instruction list in the Instruction combo box drop down when there is no leading text for the mnemonic (5189); Ladder Instruction Toolbox properly position at first launch (6552); simplified DEVREAD entries for BX POMs (6793); properly handle High Speed Edge settings for High Speed I/O instructions; BACKUP instruction – added support for Simulator; STRPRINT/EMAIL FmtDate and FmtTime Script Editor Format selection better reflects actual format (6817); MATH Editor when Element Picker button is hit for Results field, Element Picker dialog is properly shown; EIPMSG Monitor Values in Data View properly ignores unused placeholder parameters (6752); RAMPSOAK Editor properly handles invalid keystrokes (6748); MSREGRD/MSREGWR properly reports WORD ranges of structure fields (6830, 6831); Disable UI during Find All but allow Status to update (6848); Block Cursor movement works properly when cursoring to/from large box instructions that do not fully fit in the window (6850); When reporting a Short Circuit in an edited rung, report the row/column location of one of the contacts being short-circuited (5297); Expression Relational Contact Editor fields properly displayed when Nicknames are ON and Elements are OFF (2.10.2, 6882); properly disallow read-only string fields in instruction output parameters (2.10.2, 6867); mouse pointer no longer flickers back and forth between normal arrow and rung select arrow in the Address column (2.10.2, 6885); properly position Output boxes and coils in the Output Column whenever block cursor is currently in the contact/input area (2.10.2, 6887); properly handle the Element Browser button in the Contact/Coil editor (2.10.4).

b. Communication – reduced lockups across multiple online Designer instances (6828); startup of the Communication Server does not disable Windows Desktop or top window (6843).

c. Communication/Status – properly handle UDT sub-structure status when UDT is more than 255 BYTEs.

d. Select PLC Connection Dialog – reduce PLC querying time (6657).

e. Project Browser – when displaying a Rung Comment in Code-Block tree, remove any leading carriage-returns/spaces since the tree label only shows the “first” line of the Rung Comment.

f. Protected Code Blocks – never implicitly export protected code (6535); Export Program – prompt user when exporting unlocked protected code-blocks (6780).

g. Launch Pad/Projects Panel and Select Project dialog – better handling of network sourced project files (UNC or mapped drive; 6006, 6061, 6772, thanks to JM, FD).

h. Element Picker – When choosing to flag Unused Elements with Nicknames as Used (X in the usage grid), apply that to the behavior of the Find Next/Previous Used/Unused buttons behavior (6790).

i. System Configuration – Serial Port Configuration – when changing from Modbus Client, ensure device is currently not part of the Modbus Scanner configuration; validate existence of all Modbus I/O Scanner devices, also properly handle when Modbus I/O Scanner device is missing; User Data Types – do not allow UDTs to have same name as existing Built-In pristine names (6797, thanks to JO); User Data Types – do not accept an import of a UDT with too many fields (6864, thanks to SM); I/O Configuration BX Universal Analog Units/Count on 5V range works properly; User Data Types – report when the UDT configurations exceed the reserved configuration area size (e.g. 80+ UDTs of 30+ fields each; 6791, thanks to CJ); IP Address Configuration – DHCP only supported on BRX (6807); Module Configuration – disallow digit as first character of Module Configuration Name and Device Name (6781); disallow empty Device Name; Module Configuration – properly displays BX-xxTHM Type E thermocouple Low degC range (just a Designer display issue, not an issue with the module or PLC firmware, 6812); adjusted invalid Device name error message (limited to 15 characters, 16 counting the "@", 5263); better online status handling of modifications to UDT schemas or dynamic system schemas like BRX HSIO Counter/Timer structures; shortcut access to device editors got a little smarter with non-Ethernet-based PLCs; properly handle data lengths when encoding specific parts of the system configuration (2.10.2, thanks to AM); EtherNet/IP Scanner Adapter Settings – Create Assembly Specific UDT dialog Parameter List Box is properly Single Selection (2.10.2); EtherNet/IP Scanner Adapter Settings – set EDS Configuration length to 0 whenever the Configuration Path is provided but a Configuration Length is not provided (2.10.2, DM-699); Memory Configuration – ensure consistent size between Raw and Scaled Analog data blocks WX/RX and WY/RY (2.10.2); properly handle change of CPU Serial Port configuration from Modbus/RTU Client (2.10.3, DM-701); Memory Configuration - passively update Raw/Scaled Analog data block sizes when they are out-of-synch (2.10.4); EtherNet/IP Scanner Adapter Settings – properly handle EDS Configuration length (2.10.4).

j. System Information – File System Error Reporting provides more detail.

k. Cross Reference View and Find – properly ignore unused placeholder parameters (6821, 6859).

l. I/O System View – better handling of background communications while re-sizing the view (6758, thanks to MG); proper handling of module warning status communications (2.10.2, 6829).

m. Data View – properly handles request to no longer nag about saving Temporary Data View as a disk file.

n. Program Check – Warning 130 Writing to High Speed Output Y via instruction properly reported (6768).

o. Documentation Editor/Database – better handling of inconsistent records (6770); properly handle implied Nicknames of cast and struct member forms of a Nickname; handle narrow resizing of Documentation Editor.

p. Select Project Dialog – loads faster by adding option to not query Project’s Link/Connection details (6664).

q. Element Picker – properly handle F9 keystroke to launch Element Browser from the Element Picker; Element Browser from Element Picker is useful to document “picked” element and/or utilize the Cast Builder feature (6762).

r. Connect to PLC – better handling of Instruction ID/Edge Bit differences (6516, 6773); properly handle User Data Type and Memory Configuration differences (6734); properly update local Instruction ID/Edge Bit when programs match (6827).

s. Simulator – better handling of launching the Simulator (6801).

t. Communication Server – better handling of USB devices (6777).

u. Parameter Ranges (Find) – properly handle sparse ranges like JSONBUILD struct field range across IDs along with other Find Range issues (6695; still an issue with Cross Reference Expanded Range).

v. Tools – properly handle launching Debug tools (6798, thanks to CH).

w. Memory View – Structure Blocks – Initial Field column widths fit to their content; properly update title text when modifications are made to the Memory Configuration.

x. Memory View and Memory Image Manager Block Editor – properly handle various sizes of signed integer data types formatted as hexadecimal and octal, e.g. FF for Signed Byte, FFFF for Signed Word, FFFFFFFF for Signed DWord (6811)

y. Memory Image Manager – properly handle STRING data blocks as a value type like bit or numeric, not as a structure with fields (6805, thanks to E); Utilize a modal Operation Status Dialog when reading or writing Regions from/to the PLC.

z. String Status – when doing status on a corrupted String (incorrect .MaxLength or invalid .Length), reveal that to the user in the status text.

aa. Trend View – continues to monitor values after second instance of Designer attempts to utilize same Connection/Link (also affected Link status in Launch Pad’s Link Panel; 6710, thanks to RB).

bb. Data View and Trend View – Various instructions’ Monitor Values set of parameters have been adjusted (6752, 5535, DM-159).

cc. Do-more Technology Versions dialog/Software Versions dialog – append “labeled Windows 11” text next to the reported Widows 10 text (yes, Microsoft reports Windows 11 as Windows 10).

dd. Status Bar – Offline PLC designation pane properly shows tooltip that clicking on the pane brings up the *Offline PLC Setup* dialog.

ee. Resolve Online/Offline Differences Dialog – for projects flagged to compare Memory Image Regions, point users to the *Compare Memory* button on the dialog when differences are found in the Memory Image Configuration/Data.

ff. Memory Import – requires commas to separate values.

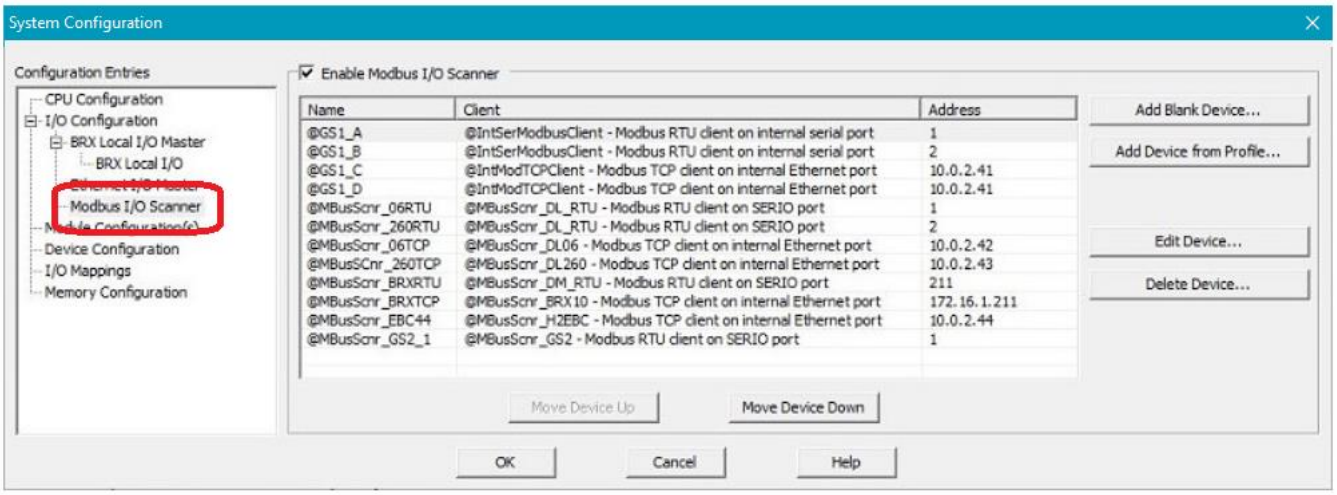
gg. DirectLOGIC Migration tool - properly supports DL-262 CPU DirectSOFT Projects (6825); mentions additional Do-more Immediate instructions that are helpful when utilizing DL Immediate contacts (6813).

hh. Video Browser dialog – ensure proper modality when launched from Help menu versus a modal dialog's System Menu (2.10.2, 6888)

ii. Fixed some F1 Help hot key in certain dialog boxes (2.10.2).

1. **Modbus I/O Scanner** *(BRX/Simulator only, requires Do-more Technology version DmT 2.9)*

   Do-more BRX and Simulator PLCs can use the Modbus I/O Scanner to process Modbus Read and Modbus Write requests similar to the way it handles local I/O and Ethernet Remote I/O. It does this by creating a *Scanner Device* for any combination of up to 32 Modbus/TCP and/or Modbus/RTU servers/slaves. The Scanner Device can additionally perform any required format conversion on the data, **eliminating the need to add ladder logic** to process the data before it is sent or after it is received.



   A customized set of I/O for each individual server/slave is defined such that the Do-more PLC sends Modbus Read and Write Function Codes as part of its I/O cycle by specifying the set of Modbus Data Types and Addresses (Coils 0xxxx, Discrete Inputs 1xxxx, Input Registers 3xxxx, Holding Registers 4xxxx). No programming is necessary for these configured background I/O updates.

   In addition to the background I/O, individual slave parameters can also be specified for **event-based requests** using the new **MSREGRD** and **MSREGWR** instructions (see below) for configuration or other non-polling data.

   Some **predefined Modbus Device Profile files** for common Modbus products are included, like GS Drives (no need for GS-EDRV100), Sure Servo Drives, STRIDE Analog and Temperature modules, even “generic” profiles for other Automation Direct PLC lines like Click and DirectLOGIC, making it much easier to monitor and control these devices from your Do-more PLC.

a. Modbus I/O Scanner Monitor (Debug menu)

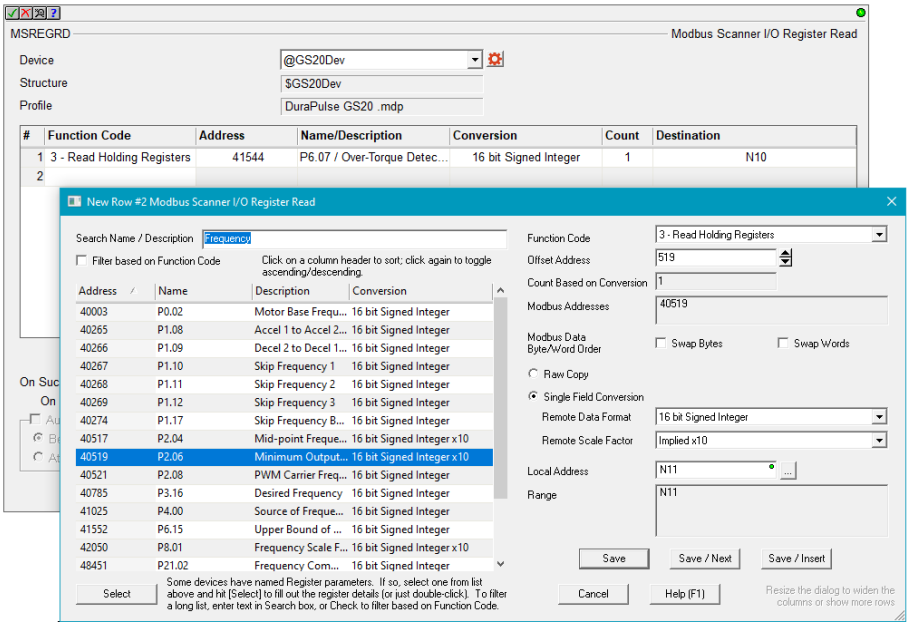
After the Modbus I/O Scanner is configured and running, the Modbus Scanner Monitor can be used to display the "health" of the currently configured network of Modbus Scanner Devices.

2. New Instructions *(DmT 2.9)*

a. MSREGRD – Modbus Scanner I/O Register Read
MSREGWR – Modbus Scanner I/O Register Write

(Ethernet BRX/Simulator only)

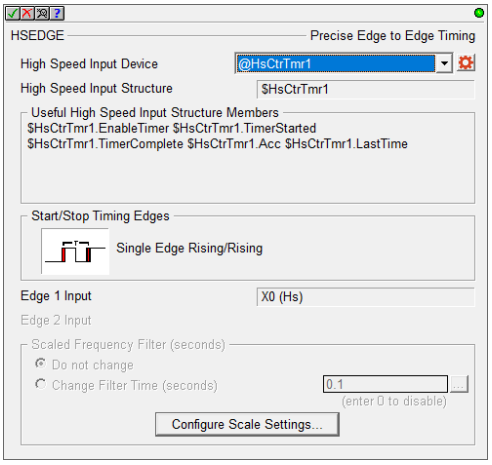
Used in combination with Modbus I/O Scanner devices for non-polling Modbus Server/Slave device parameters, like writing configuration parameters or reading static information like Model Number, or any other event-based data access.



Filling in the Function Code and Modbus Address values for these instructions is much more useful when used with pre-defined Profiles that have their many parameters also defined such that you can use the Browser mechanism on the left side that then fills out the information on the right side. Regardless, any valid Modbus Function Code and Address can be manually entered on the right side of the form.

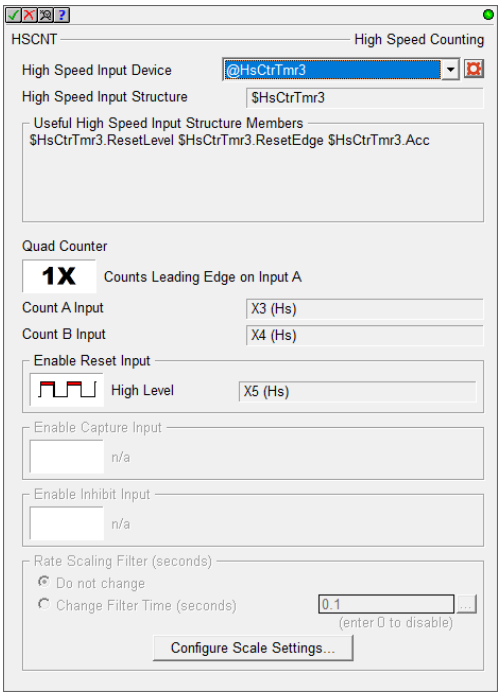
b. HSEDGE – Precise Edge to Edge Timing

Provides a Ladder Logic reference to your BRX High Speed Timer function (5551).



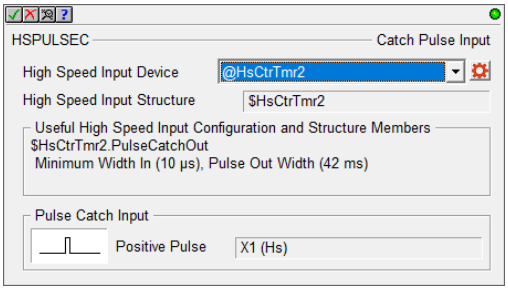
c. HSCNT – High Speed Counting

Provides a Ladder Logic reference to your BRX High Speed Counter function (5551).



d. HSPULSEC – Catch Pulse Input

Provides a Ladder Logic reference to your BRX High Speed Pulse Catch function (5551).

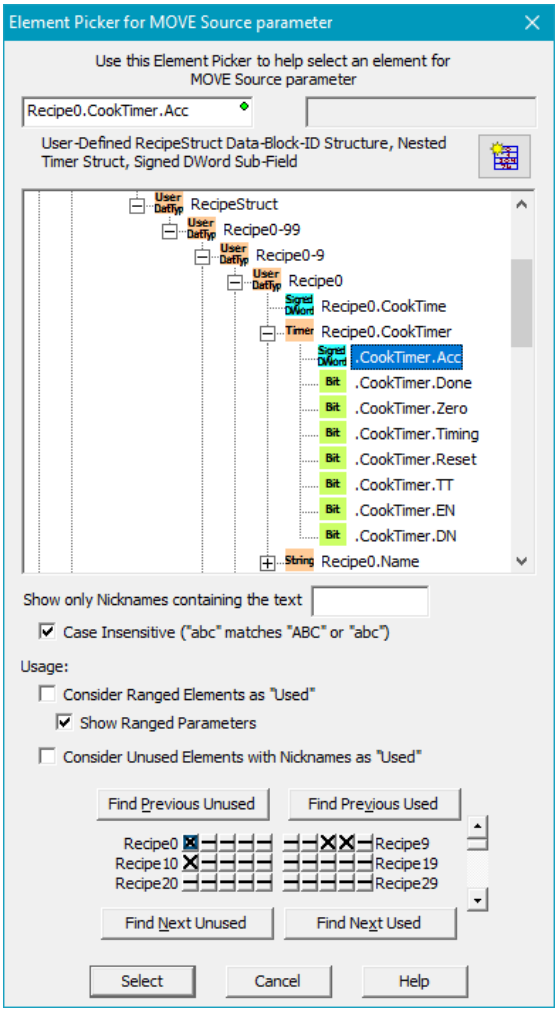


3. Nested Structures within User Data Types

Add other structures to your User Data Types like Strings, Timers, Counters, PID, Date/Time, et. al., in addition to your other User Data Types. Multiple structure members of most built-in and UDT structure types can be added to a UDT.

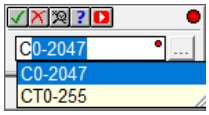
So a RecipeStruct UDT can have a nested .Name String field and a .CookTimer Timer field, then have a block of 50 Recipes and reference Recipe42.CookTimer in a TMR instruction, or CurrentRecipe.Name heap-item in a report, or use Recipe[V7].CookTimer.Acc in a MOVE box.

Note: *Nesting is limited to one additional structure level*, so you cannot embed a UDT that contains other structures inside yet another UDT. Structures with just bit and numeric fields can be embedded within UDTs, like a Timer structure embedded inside a Recipe UDT, Recipe42.CookTimer.Acc. However, Recipe42.Control.CookTimer.Acc (note Control structure level) is not supported because Control structure contains a (Timer) structure. Also, some complex built-in structures are not nestable like Programs and Axis.



4. Enhancements

a. **Element Field Auto-Complete ID Edit** – when you arrow down or select an Element Range from the Auto-Complete list, the edit control automagically selects the text characters of the ID range to make it easy to enter the actual ID:



In the above example, after selecting the C0-2047 item from the Auto-Complete list, the next keystroke will replace the selected text in the edit field `0-2047` with the entered number keystroke. You used to have to manually edit the text of the ID range, which required a combination of various keystroke sequences of Arrow keys, Shift key, Delete key, and/or mouse actions (5943, thanks to CA).

b. **Ladder View** – warn when using a **Standard Input or Output in High Speed instructions** that specify speed parameters faster than 2ms or 500Hz (6609). For example: warn when setting the Maximum Velocity parameter to 1000Hz in the AXCONFIG for an Axis device that is bound to a Standard Discrete Output (1000Hz would only work with a High Speed Discrete Output).

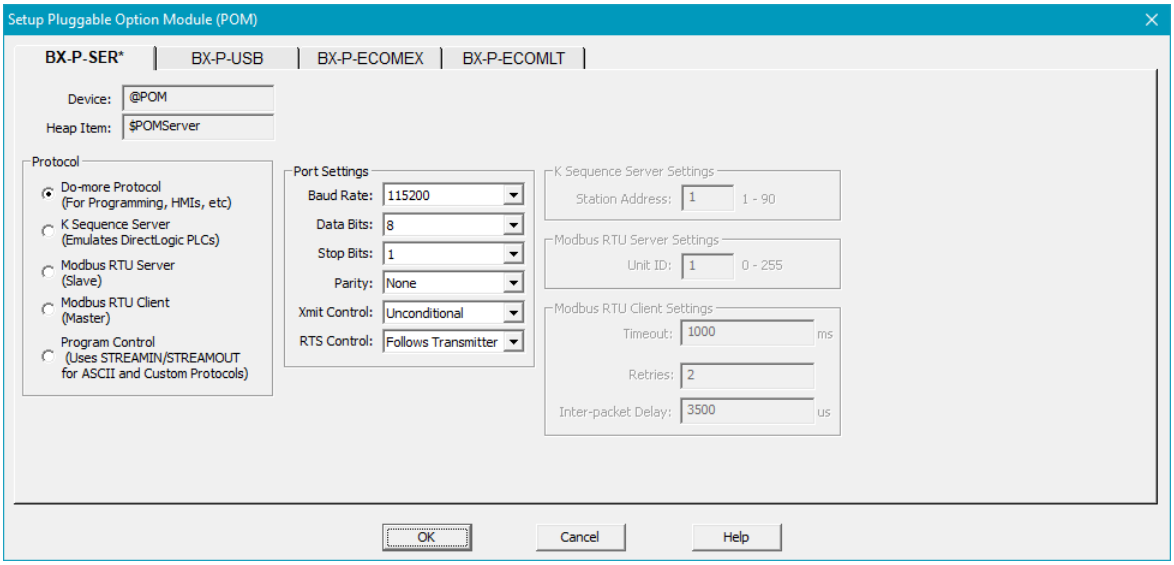
c. **Ladder View** – **COPY** instruction now supports copying a range of strings between blocks that contain strings of different Maximum Lengths (6594). STRCOPY warns when the Source string literal is too long to fit in the destination string element. Improved COPY instruction's warning and error reporting.

d. **Ladder View** – **FILE*** instructions do not support arrays for the File Handle Struct parameter.

e. **Ladder View** – **Find dialog** added a checkbox to *Close dialog on Find* (5607).

f. **Ladder View** – **Comment Editor** dialog supports setting the default Font size for when you create a new Rung Comment. Factory default is Medium, so it can be changed to Small, Large, or Huge (6643).

g. **System Configuration** – **BRX POM Configuration** has been moved from being part of the CPU Configuration to being its own tabbed dialog (accessed from the CPU Configuration Entry page of the System Configuration dialog):



As new BRX POM modules are developed, their configurations will be added to this dialog.

h. **System Configuration** – **Memory Configuration Entry/Structs (Built-In/UDT)** page, Attributes column designates which Structures are Nestable (N) and which ones are Deep (D) (see *Nested Structures within User Data Types* above).

i. **System Configuration** – made the **Server Whitelist Settings** dialog easier to use.

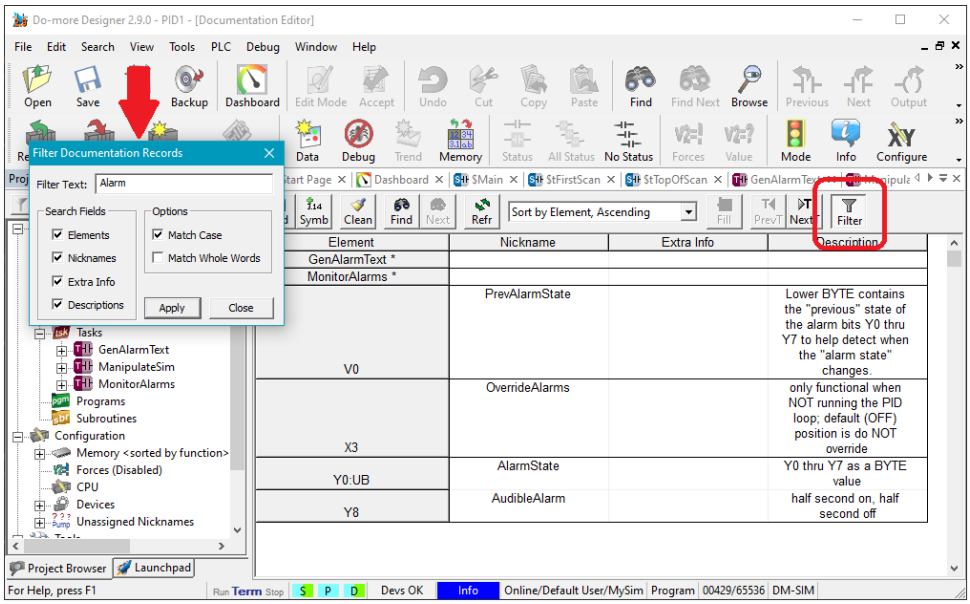
j. **Global Options** – added options whether to **auto-generate** Project Export files and C-more Export files (6093).

k. **Element Picker** – added checkboxes for classifying certain **Unused Elements** as Used (6602):
   * Unused Elements within Ranges
   * Unused Elements with Nicknames

l. **Change Value** dialog – when entering a structure field that has a custom format by default (say a timer accumulator), automatically choose that custom format display/editor (6704).

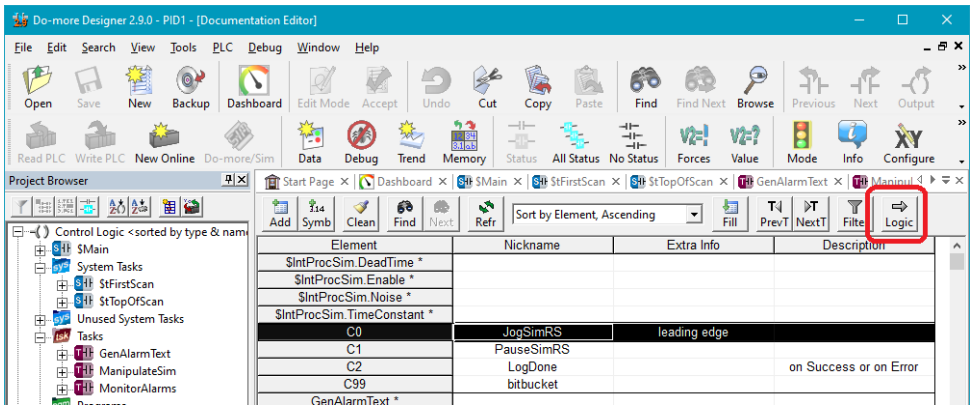
m. **Memory View** – added support to edit fields of structure blocks (6629). For REAL fields, added support for Exponential format like 6.02E+23.

n. **Documentation Editor** –Added a **Text Filter** mechanism to reduce the viewable set of records. The Filter dialog is mode-less in that you can continue to do other work in Designer while maintaining that Filter in the Documentation Editor. It auto-hides as you are doing other work away from the Documentation Editor - just click on the Document Editor to bring it back.



o. **Documentation Editor** – Added **Go To Logic** button that brings up the first occurrence of the selected Doc Editor Element in Ladder Logic:

In this example, clicking the Logic button with C0 record selected will open $Main code block to address 18, the first occurrence of C0 in Ladder logic.



p. **Documentation Editor** – **Add Documentation Record** dialog Nickname field automagically replaces spaces with underscores as you type (6640).

q. **Trend View, PID View** – added a **Reset** button that clears only the graph on the screen and starts trending on the left edge (3979). The collected set of timed data point values is still maintained, which can be viewed by changing the time scale or going into Historical mode.

r. **Dockable/Floatable Views** – added Help Topic **DMD0500 Docking and Floating Views** that provide details about how to manipulate your Designer work environment. Whether you have a multi-monitor system where you float multiple groups of multiple Data Views outside the Designer main window, or your development system is on the opposite extreme where you have a small laptop screen, so you need to maximize Ladder View real estate, but you need your Project Browser and Cross Reference views to be easily accessible using the auto-hide mechanism where just floating your mouse cursor over the tab reveals it, but then it auto-hides when you move the mouse cursor away (4031, thanks to MN).

s. **Constants** – added Help Topic **DMD0499 Using Constant Values** that describes the best use of constants, constant formats, status data formats, and Symbolic Constants (4279).

t. **New System Status Nicknames**

ST156	$QueueFull	Turns ON after a Queue Load instruction (FIFOLOAD, LIFOLOAD) attempts to add a new entry to a full queue (2.9.3, requires firmware 2.9.4)
DST412	$AssertCode	Should be 0; non-zero value indicates a firmware diagnostic code
DST413	$ForceMinScan	Minimum Scan Time in microseconds; ensure PLC scan time will be at least this long (actual scan time can be longer)

u. **Contact Mnemonics** – enhanced Help Topic DMD0186 *Instruction Set for Do-more CPUs* that list out all the contact mnemonics for each contact type (6100, thanks to DB).

5. Adjusted Anomalies

a. Documentation Editor – properly show Element Documentation Records after sorting or filtering (2.9.4, 6754, thanks to RB); properly handles Paste operation with a large Element Documentation Database that utilizes an Operation Status dialog (2.9.3).

b. Simulator – FILE* instructions properly report file status to FileHandle struct; when changing PLC modes, properly manage files that are open (2.9.4, thanks to KK).

c. Replace Dialog – better handling of List of items; after hitting Add to List button, move keyboard focus back to Replace edit field (2.9.4, 6753, thanks to GD).

d. FIFO/LIFO Queue Full Diagnostic – new error when attempting to add a record to a full queue; see new ST Bit System Nickname $QueueFull ST156 (2.9.3, requires firmware 2.9.4).

e. PLC Mode Change Dialogs - support asynchronous mode change behavior along with better error reporting (2.9.3).

f. System Configuration – Edit Modbus I/O Scanner supports ordering the Modbus Comm and Modbus Field nodes in the configuration tree using Move Up/Down buttons (2.9.4, thanks to GD); Edit Modbus I/O Scanner Local Element entry field properly allows Read Only structure fields, and properly disallows array elements (2.9.3); Updated SMTP Client Settings *Test Settings* (2.9.3); Edit Modbus I/O Scanner Device dialog lets you add a Modbus/TCP Client device using the new *Add* button next to the Modbus Client dropdown box (2.9.2); Modbus I/O Scanner Profiles support Coil Read/Write and Input Read (2.9.2); automatically bind Modbus I/O Scanner Profiles to current Modbus I/O Scanner Devices (2.9.2); enabled Help(F1) button in various dialog boxes (2.9.2); Serial Port Physical Layer configuration (RS-232/RS-485) propagated properly when PLC CPU types change (2.9.2).

g. Ladder View – STRPRINT Script Editor properly allows exclusion of Thousands (Comma) Separator in FmtReal command (2.9.4); JMP instruction description changed to *Transition From This Stage* to better illustrate that JMP is NOT an assembly language type Jump/Goto, but a higher level SFC-like transition (logic below enabled JMP within containing Stage still executes on that transitioning scan, 2.9.4); properly handle Replace of a structure with a nested structure (2.9.3, 6743, thanks to RB); after Replace, adjust contact/coil/box size (2.9.3); MSREGRD/MSREGWR added Range details to Name/Description column (2.9.3, 6741); MSREGRD/MWREGWR support for Copy of whole structures and range structure fields (2.9.3); MSREGRD/MSREGWR Monitor Values handles table parameters (2.9.3, DM-609); MSREGRD/MSREGWR editor properly updates Profile Parameter Table after changes are made (DM-610); proper handling of placement of New Toolbox dialog box (2.9.3, 6552/6553 thanks to BC); FIFO/LIFO Queue Status proper handling of unwritten changes to queue block size (2.9.3); proper handling when editing elements in a table-based instruction with IDs that are out of range after a block size change (2.9.3); STRSUB – warn when inconsistency exists between Input and Output Strings' Maximum Lengths, Offset, and Length parameters that could cause unexpected truncation of desired Output String (2.9.3, 6728/6745); MATH – added Element Picker button for Expression field that lets you easily browse for element names since it is a free-form editor and not auto-complete (or just hit F9 key) (2.9.3, thanks to RB); Report Control editors properly handle launching Element Browser using F9 key when Element Picker is already opened (2.9.3); proper handling MRX/MWX status display when range of 2 16-bit Registers are transferred to/from a complete 32-bit integer or real (2.9.2).

h. Connect to PLC – converting PLC Opcodes to Element properly handles array of a BYTE or WORD struct field (2.9.2).

i. Edit User Data Type - when connected to a PLC, and Designer's Memory Configuration becomes incompatible with what is currently in the PLC, disable Online Status (2.9.2).

j. Element Text Entry – properly handles PL array reference like PL[V42] (2.9.2).

k. Program Export/Clipboard/Copy/Paste – export nested UDT definitions before the deep UDT that references them (2.9.2); properly handle nested UDT structures when pasting (2.9.2); properly set Disk and PLC Modified flags when pasting a clip that changes System/Memory Configuration (2.9.2); optimizations on Paste (2.9.2).

l. Project Browser – Adjust *Force* subtree entries when Designer and PLC Memory Configurations become incompatible (2.9.2).

m. Ladder View – MEMCOPY instruction, wrong error message if source or Destination parameter is unassigned struct (6578).

n. Efficiently print multiple row rungs across multiple pages (6619).

o. Ladder View – PWMOUT instruction's High Speed Discrete Output parameter that is not entered explicitly (it is implicitly based on the entered PWM Device parameter) shows up in Cross Reference (6630).

p. Ladder View – MRX/MWX instruction's valid range for Number of Modbus Elements properly based on the Modbus Function Code. For example, Read Coils range is 2008 Bits, but Read Holding Registers range is 125 Registers (6625); MRX/MWX editor properly handles IP Address field when changing device from a Modbus/TCP Ethernet port to a Modbus/RTU serial port (6651). MRX/MWX Do-more Range parameter's Element Picker and Auto Complete list reflect the valid ranges based on the current Function Code (6677). Properly show sub-range in Ladder Display using casts (e.g. D0:W0) when Modbus Register Count is odd. MWX Do-more Range properly handles constant Do-more parameter.

q. Ladder View – RX/WX Remote Memory Block, Built-In field editor no longer setting Remote Built-In elements to the local project's nicknames (6701)

r. Ladder View – DATAINFO – Query Information about Data Memory instruction, corrected wording of Heap Item Information Type entry *Number of DWORDs* to *Number of BYTEs in Heap Item*. The instruction in the PLC always has returned Number of BYTEs for that entry, even though the wording in Designer was not correct.

s. Ladder View – Common Timer editor properly limits Timer types within a Subroutine (6667).

t. Ladder View – added support for bit memory cast as numeric in the FIFO* and LIFO* Queue instructions (6639).

u. Ladder View – STREAMIN warns when Data Destination Numeric Data Block *Buffer Size in Bytes* value is smaller than *Complete when Length is* value (6669).

v. Ladder View – MEMCLEAR validates the parameter range (6671). MEMCLEAR box width displays correctly. MEMCLEAR status display optimized (6690).

w. Ladder View – do not allow array references for File Handle parameter in FILE* instructions (6685).

x. Ladder View – Print/Print Preview no longer trims off wide boxes. When returning back to the Ladder View, the width of those boxes are displayed properly (6627).

y. Ladder View – as editing various parameters, properly set inter-dependent dynamic parameter ranges (6677, 6650).

z. Ladder View – constrain set of Timer types in Common Timer when inside a Subroutine (6667).

aa. Ladder View – proper display of instructions after a Print Preview (6627).

bb. Ladder View – added confirmation dialog to Replace operation (6649, thanks to GD).

cc. Project Browser - properly shows dynamic system structure schema changes like when adding scaling to a High Speed Counter/Timer resource (6628).

dd. Project Browser – Properly show dynamic updates to the Memory Configuration.

ee. System Configuration – Edit User Data Type dialog properly handles DEL key when editing the Structure Name field (6645).

ff. System Configuration – SMTP Client (EMAIL) dialog properly initializes Port field after re-opening dialog.

gg. System Configuration – ensures device name's heap item name does not conflict with an existing heap item (6683).

hh. Project Files – warn when an entered Project file/folder name or a Designer Folder Setting name is too long for Window's file system (6634).

ii. Data View – properly handle Offline Data View when Connecting to a PLC (6706).

jj. Trend View – properly restores the Minor Tick Mark count (6654).

kk. Memory View – need to unconditionally close UDT based Memory View when the UDT definition itself is modified via the System Configuration dialog.

ll. Memory View –upon opening a Disk Project whose Memory Configuration is incompatible with its associated PLC Project, do not open any incompatible Memory Views.

mm. Clear PLC Dialog – keep the dialog open if any issues are reported.

nn. BRX Axis status – changed unconfigured status text from <disabled> to <unconfigured>.

oo. JSON Pretty Print – properly report Windows DOM object failure (6665, thanks to BG).

pp. Status Updates – adjusted Designer's Communication Update mechanism to better handle status update bursts (6670).

qq. Write to PLC – properly verifies PLC mode when required to switch to Program mode.

rr. Close Project – all view types are properly queried about any pending changes before closing.

ss. Export Element Documentation – properly handling used vs. unused options and C-more export options (DM-590).

tt. View Status – try to govern status update overload when the application GUI starts becoming unresponsive.

8. New Hardware *(these require Do-more Technology Version 2.8)*

BX-P-ECOMEX	BRX POM: Secondary Ethernet port • **Client** capabilities: Ethernet I/O Master, EMAIL(SMTP), MRX/MWX, RX/WX, DLRX/DLWX, HTTPCMD, MQTT(PUB/SUB), DNS, PING, EtherNet/IP™ Explicit, FTP(GET/PUT see below), SNTP, STREAMOUT, PACKETOUT, PEERLINK, GSREG(RD/WR) • Server Support: Modbus Server, EtherNet/IP™ Explicit Server, HTTP Web Server (see below), TCPLISTEN, PEERLINK, STREAMIN, PACKETIN, Do-more TimeSync, … • Supports DHCP (added DHCP to Primary Internal Ethernet Port also)
BX-HSIO4	Similar to BX-HSIO1/2 High Speed Discrete I/O module except: • Input Frequencies up to 2,000,000 Hz (8 times faster) • Output Frequencies up to 2,000,000 Hz (8 times faster) • Input and Output Type: Differential TTL • Nominal Voltage Rating: 5 VDC
BX-16NF3	BRX 16 point TTL Input, Sinking/Sourcing, 2 5 VDC
BX-16TF2	BRX 16 point TTL Output, Sourcing, 20 mA @2-5 VDC
BX-16CF3F2	BRX 16 point TTL Combo, 8 pt. Input Sinking/Sourcing, 8 pt. Output Sourcing
BX-08TRZ	BRX 8 point Relay Output, Dry Contacts
BX-16TRZ	BRX 16 point Relay Output, Dry Contacts
BX-05TRS-1	BRX 5 point High Current Relay Output, Form C, 8A @12-48 VDC, 24-240 VAC, or 0.5A @100-125 VDC

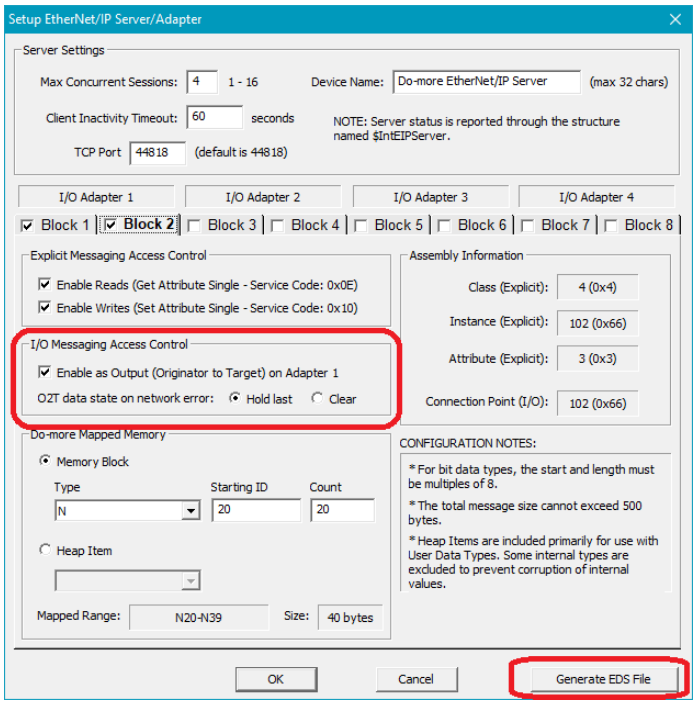
9. EtherNet/IP™ Adapter w/Implicit Messaging *(Ethernet BRX/Simulator only, DmT 2.8)*

Configure up to 8 blocks of 4 **Adapter Pairs** as an EtherNet/IP Adapter, utilizing Implicit Messaging for **real-time** control by your Scanner device.

For each Adapter Pair, the odd numbered Block can be configured as **T2O**, and the even block can be configured as **O2T**. Blocks can also be configured for Explicit.

In addition to numeric/bit data blocks like N or C, blocks can be also tied to data blocks of Structures, and to **User Data Type** and Heap-Item structures, providing for a true **object instance** interface.

Generate the BRX's **Electronic Data Sheet** file with the push of a button to easily interface your configuration with **your EtherNet/IP Scanner**.

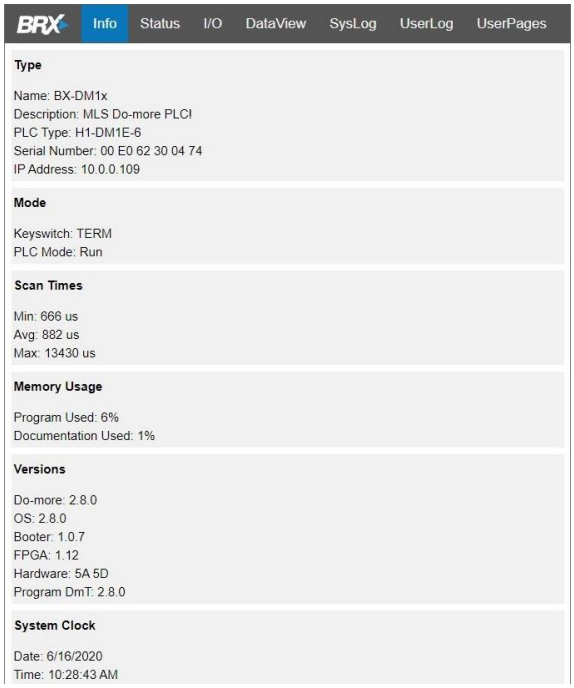


10. HTTP Web Server *(Ethernet BRX/Simulator only, DmT 2.8)*

Ethernet-equipped BRX CPUs have an on-board web server that can be accessed by any web browser using the IP address of the BRX CPU as the URL.

The CPU's web service has a REST API allows access to the memory elements in the BRX CPU from any web browser or other web client programming package. The on-board web server uses the REST API to automatically build several web pages that can be displayed in a web browser.

Once the web server has been enabled in the System Configuration, the main web page in a BRX CPU can be opened with any web browser, simply enter the TCP/IP address of the CPU as the URL.



Info: basic information about the PLC and its current state
Status: any current Info, Warning, and Error messages
I/O: current status of local discrete and analog I/O, updated once per second
Data View: a configurable table of selected element status locations, updated once per second
SysLog/UserLog: the current System Log and User Log tables

For details about the Web Server, see the Help Topic DmD0481 The Web Server.

REST API

The REST API can return the contents of any PLC memory location in JSON formatted records. The REST API is accessed using a URL with the appropriate parameters.

The format of the URL is <PLC-IP-Address>`/data/json?`<client-name>=<do-more-element>, for example:

```
192.168.10.42/data/json?MyScanCounter=DST0
```

and will respond with a JSON object containing the client-name and the element's data value:

```
{
"MyScanCounter":14437656
}
```

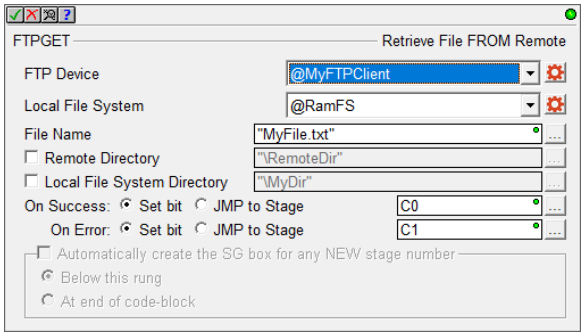
The REST API URL supports lists of elements, a range of elements, even structures as embedded JSON objects with Do-more structure field names as the nested object's field names.

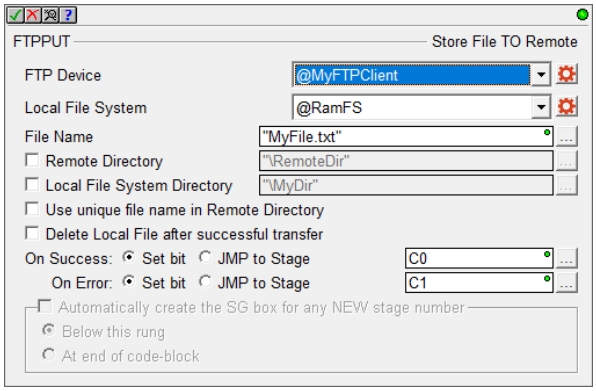
For all the details about the REST API, see Help Topic DmD0482 REST API.

11. New Instructions *(DmT 2.8)*

a. FTPGET – Retrieve File FROM Remote
FTPPUT – Store File TO Remote
(Ethernet BRX/Simulator only)

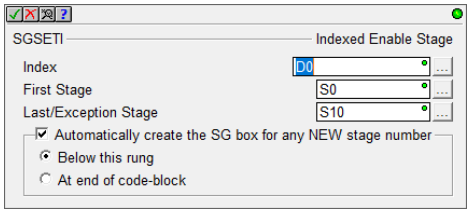
The FTP functionality is FTP Client only (not Server). The BRX PLC can GET(read from) and PUT(write to) files between a remote FTP Server and the PLC's File System.

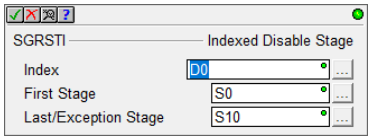




b. SGSETI - Indexed Enable Stage
SGRSTI – Indexed Disable Stage

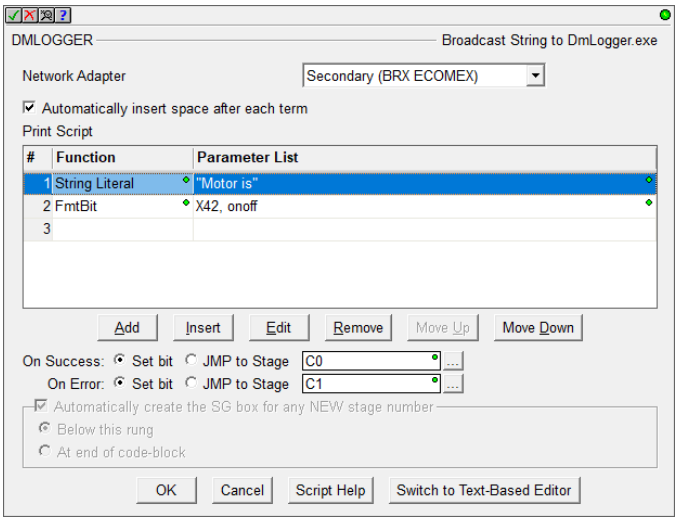
Similar to the capabilities that JMPI (Stage Indexed JMP) provides, this pair of instructions lets you Enable or Disable another Stage indirectly via a variable index of a range of Stages. In the examples below, if D0 equaled 3, then S3 would be Enabled (or Disabled). While JMPI also transitions OUT OF the CURRENT Stage, the SGSETI/SGRSTI will NOT transition out of the current stage, but just enable/disable the other stage.





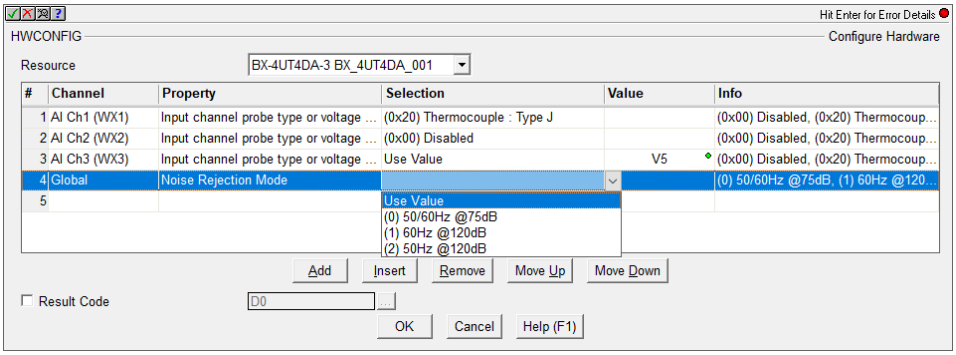
c. DMLOGGER – Broadcast String to DmLogger.exe

Combines the need for **selecting a Network Adapter** for BRX Secondary Ethernet Port to broadcast the string to any PC with DmLogger.exe listening, and the need for **Print Script** capabilities.



d. HWCONFIG – Configure Hardware *(BRX Local Only)*

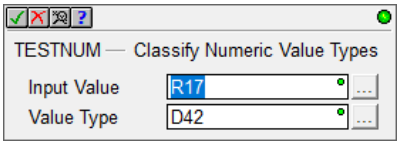
You can now manipulate certain I/O Configuration settings at runtime. For example, the on-board Analog I/O voltage/current setting(s) is normally configured statically in the System Configuration, but the HWCONFIG instruction can change those settings dynamically at runtime. So you can change an Analog Input from unipolar 0-5V to bipolar +/- 10V.



Manipulate High Speed Input Filter times, set Thermocouple Probe Types, et. al. Not all BRX modules are configurable at runtime. Some of the supported modules are MPU Onboard, BX -3 Analog Input/Output/Combo, and BX-HSIO. See help topic DmD0488 for details.

e. TESTNUM – Classify Numeric Value Types

Sets the Value Type to one of five possible "types" based on the Input Value (thanks to PK).



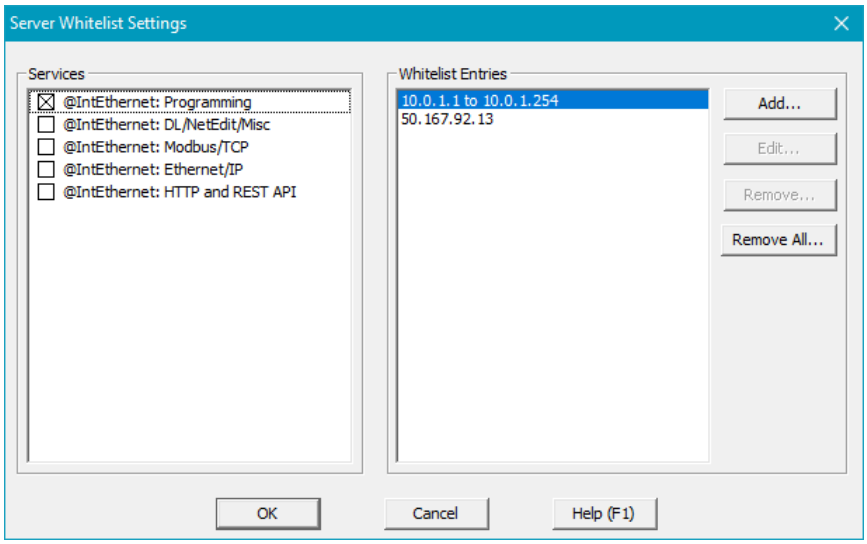
Tests REAL Input Value for IEEE 754 Floating Point classifications of Not A Number(0), Plus/Minus Infinity(1), Plus/Minus Zero(2), Subnormal(3), and Normal(4) Value Types.

Tests INTEGER Input Value for Min/Max Integer(1), Zero(2), and Normal(4) Value Types.

12. Server Whitelist support *(Ethernet BRX/Simulator only, DmT 2.8)*

per Server function, lets you specify a Whitelist of IP Addresses and/or IP Address Ranges allowed for that specific function.

PLC->System Configuration… CPU Panel, Whitelist Settings button.

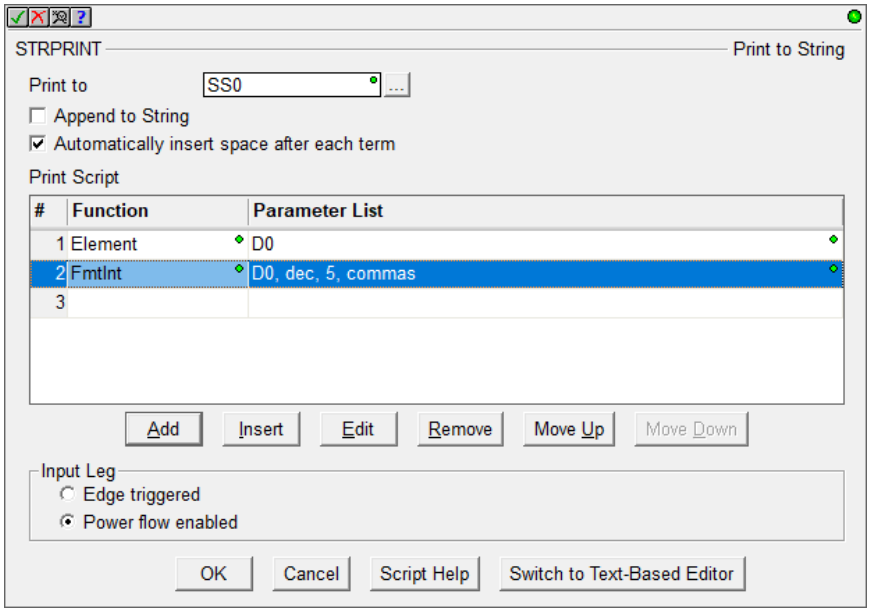


13. Table Based Script Editor for STRPRINT, EMAIL, and DMLOGGER (6431)

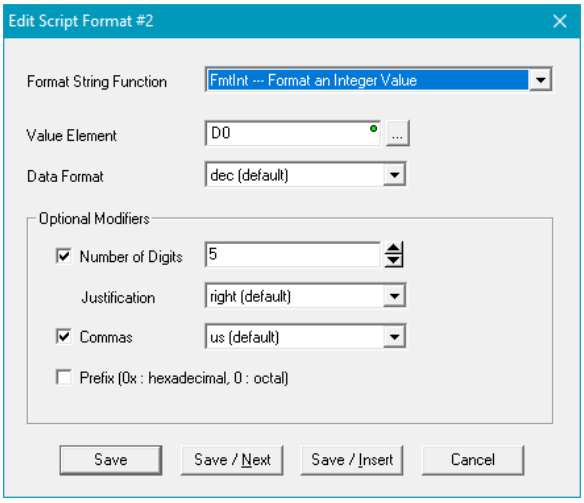
The original editors' multi-line text editor required knowing the function names, parameters, and keywords.

The new editor is table-based with intelligent form command entry, making it easy to see all the options for all the different Print Script commands.

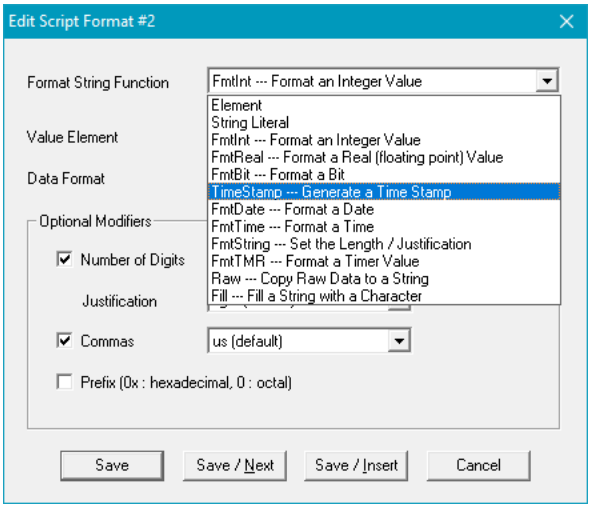
(To switch back to the Text-Based editor, just hit the button at the bottom).

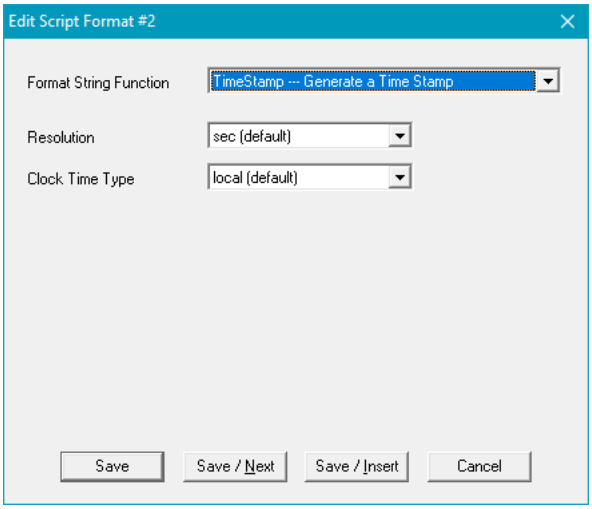


In the Table Editor, when you add/edit a new function, you get a smart form that lets you fill out that specific function's parameters, like Justification of Left/Right/Zero Pad for the FmtInt - Format an Integer command.



Select a new function from the Format String Function list, the form will adjust to THAT function:





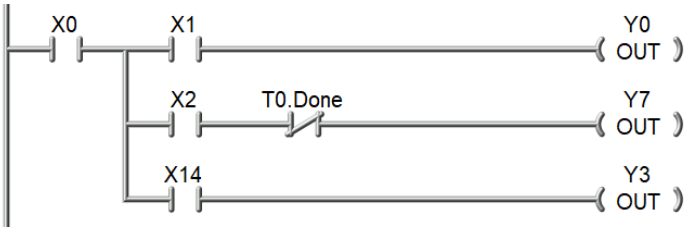
14. Enhancements

a. **Install** – migrate **Recent Projects List** from any **previous** installation (6312, thanks to JT).

b. **Ladder View** – Ladder Editor now allows **Master Relay type rungs**.

In this example, X0 enables or disables 3 other sub-rungs, which drive 3 different coils based on the state of other switches and a timer.

The Master Relay pattern can be nested within the same rung.

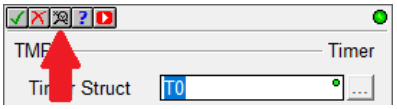


This *eliminates the AND-ABOVE-JOIN* Ladder Editor compiler error (6444, thanks to every customer since 1994).

c. **Ladder View** – added F1 Help functionality to the Ladder Editor's compiler errors that are listed in the Output Window.

d. **Ladder View** – Instruction Editor (general)

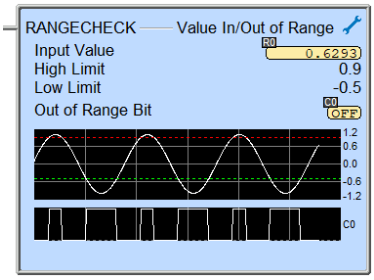
when hitting the *Browse Element* button on any Instruction Editor toolbar, always launch the original Element Browser dialog box for the current edit field (6550).



e. **Ladder View** – added support for **string literals** in **COPY** and **CALL** instructions (6253, thanks to TGM, et. al.).

f. **Ladder View** – **Network Adapter selection** in specific Ethernet TCP Client Instructions is typically **implied** by the entered Server's IP Address and then is routed based on the configured Subnets of the Primary and the Secondary Ethernet ports. However, when TCP **broadcasts** must be utilized, or for internal **configuration**, a Network Adapter must be **selected**. The following instructions added Network Adapter selection: PEERLINK, PACKETOUT, PING, SETUPIP.

g. **Ladder View** – added **Mini-Trend** to **RANGECHECK** instruction (6454)



h. **Ladder View – Instruction Specific Tools**

i. RUN, ENTASK, CALL and TCPLISTEN: open the referenced code-block's Ladder View.

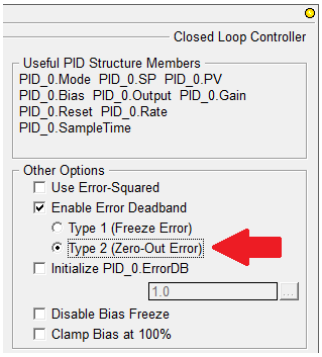
ii. MATH: show Function help topic, STRPRINT/EMAIL: show Print Script help topic (6453).

iii. JSONPARSE: JSON Pretty Print for the non-numeric Found Value parameter (6599).

i. **Ladder View** – **JSONBUILD, STRCOPY** – support **string heap-items** when the Count is 1 (requires DmT 2.8, 6559).

j. **Ladder View** – **PID** instruction **Deadband**

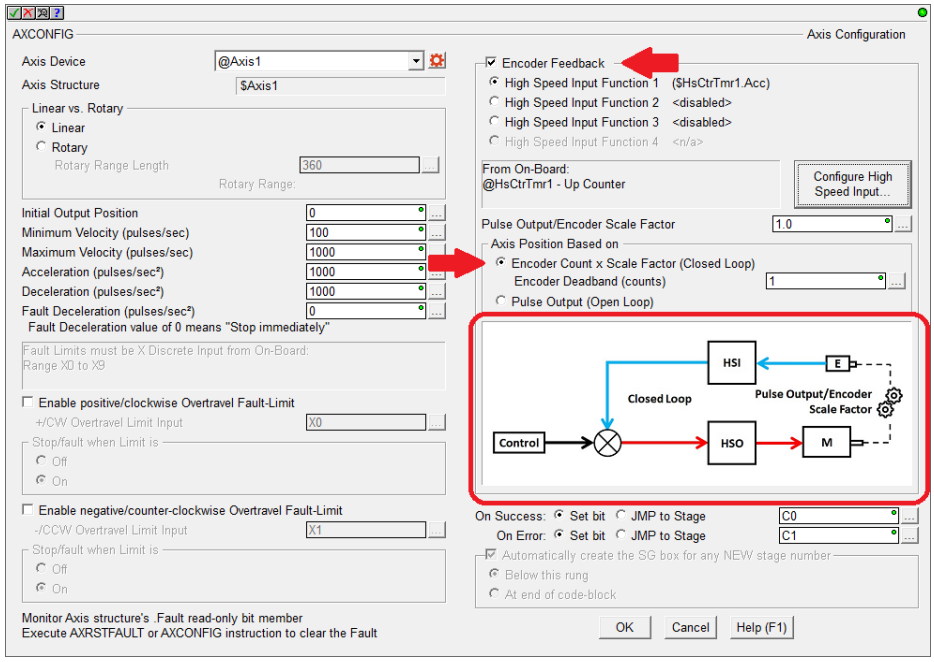
PID supports a second type of Deadband behavior. The original behavior (Type 1) freezes the Error term while it is within the Deadband value. The new behavior (Type 2) Zeros-Out the Error term while the calculated PV-SP Error term is within the Deadband value (6481, thanks to MM).



k. **Ladder View** – **AXCONFIG** instruction editor

Has dynamic **graphic** to help explain the specific **behaviors of the Axis's reported position** based on the three possible Encoder Feedback settings:

- No Encoder Feedback
- Position based on Encoder Count (Closed Loop)
- Position based on Pulse Output (Open Loop)



l. **Ladder View** – added OK/Cancel/Help buttons to all the large instruction editors that did not have them (HTTPCMD, AXPOSSCRV, AXPOSTRAP, AXHOME, AXCONFIG, EIPMSG; 6026).

m. **Ladder View** – DEVREAD/DEVWRITE supports the various FTP device parameters.

n. **Ladder View** – warn when editing Interval Time Based configured device instructions that utilize Stage Transition On Success/Error (MRX/MWX, RX/WX DLRX/DLWX, EIPMSG, MQTTPUB). These instructions report "Success" or "Error" at every time interval (since they technically never complete), so JMPing out of a stage of a recurrent time based instruction would cause that instruction to "terminate" the very first time, and hence never get a chance to run the interval time to do it a second/third/fourth recurrent time (6320, thanks to GD).

o. **Ladder View** – AXSCRIPT and Print Script command entry dialogs – added Help (F1) button.

p. **Ladder View** – adjusted JSONBUILD instruction editor Output Record group box border.

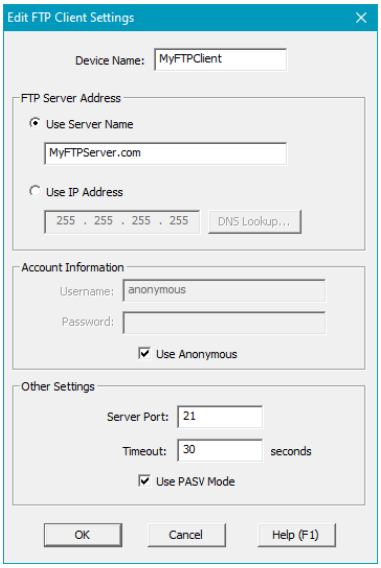
q. **System Configuration** – modified the **CPU Configuration panel layout**. Streamlined TimeSync mode, added Initial TLS TimeSlice setting, moved configuration of the Modbus/TCP Server to its own dialog box, changed EtherNet/IP section to include EtherNet/IP Adapter, added Web Server and TCP Server Whitelist Configuration buttons.

r. **System Configuration** – Setup (BRX High Speed) Match Register dialog has note next to "this value" field, to utilize the INTCONFIG instruction if the Match Register value needs to be a variable (the static configuration only accepts constants, 6588).

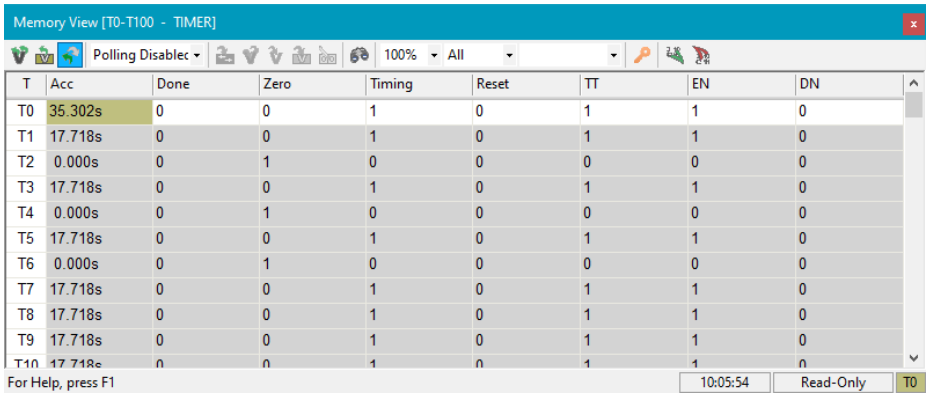
s. **System Configuration** – **MQTT Broker** Configuration supports **empty passwords**.

t. **System Configuration – Configure FTP Client Device** *(Ethernet BRX/Simulator, DmT 2.8)*

PLC->System Configuration…
Device Configuration Panel



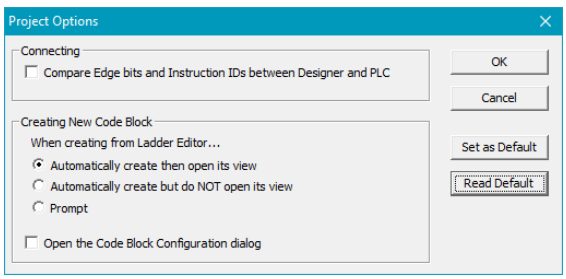
u. **Memory View** - added support for **Structure** data blocks, READONLY (6209):



T	Acc	Done	Zero	Timing	Reset	TT	EN	DN
T0	35.302s	0	0	1	0	1	1	0
T1	17.718s	0	0	1	0	1	1	0
T2	0.000s	0	1	0	0	0	0	0
T3	17.718s	0	0	1	0	1	1	0
T4	0.000s	0	1	0	0	0	0	0
T5	17.718s	0	0	1	0	1	1	0
T6	0.000s	0	1	0	0	0	0	0
T7	17.718s	0	0	1	0	1	1	0
T8	17.718s	0	0	1	0	1	1	0
T9	17.718s	0	0	1	0	1	1	0
T10	17.718s	0	0	1	0	1	1	0

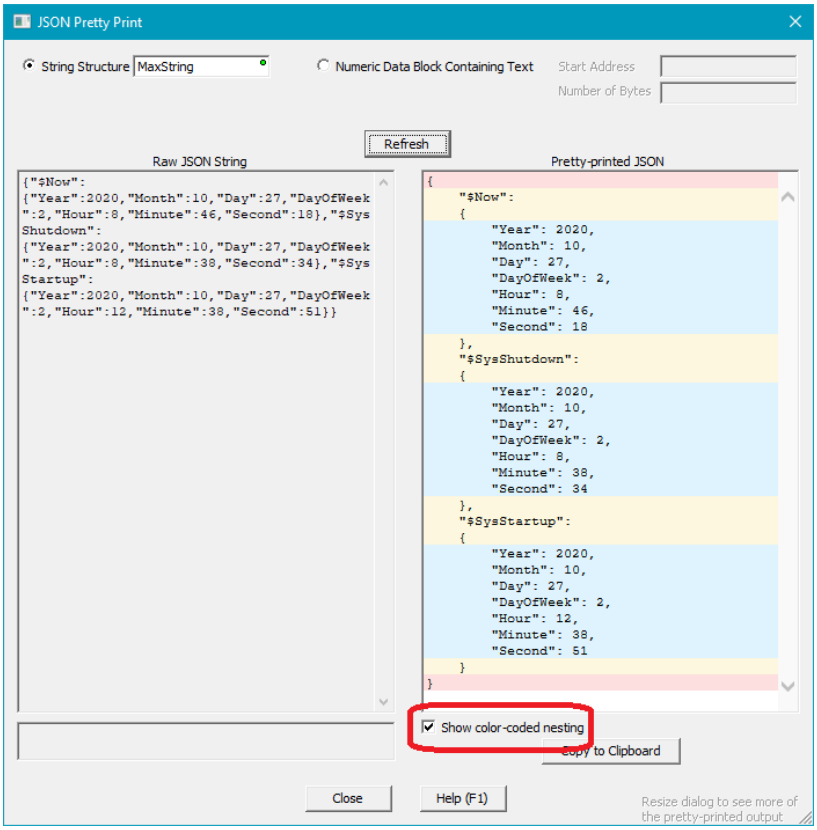
v. **File->Project Options**

File->Project Options… lets you tweak project specific Designer behaviors, like filling out the Code Block Configuration dialog when you create a new Program. These options are configurable PER project, but you can define your own "default" options for new or for existing projects that don't yet have any Project Options (6442).



w. **JSON Pretty Print**

Supports **nesting-level** based **background colors** (6513).



x. **Dump File** – Dump File message box prompts to open **Windows Explorer** to the .dmp file location (e.g. c:\users\Public\Documents\Designer2_8\Bin) and selects that specific .dmp file inside Explorer (6482).

y. **DmT 2.8 Firmware Enhancements:**

   i. **DST68 ($TLSTimeSlice)** – the amount of time per PLC scan in MICROseconds for **running the TLS/SSL security state machine** in the PLC. Some remote servers limit the amount of time a client has to perform the TLS handshaking. By allocating more time per PLC scan, more work can be done per scan, reducing the total amount of time to establish the secure connection.

z. **Program Check** – New Rules:

   i. W425 *Recommend not using within a Stage*, specifically an array indexed OUT coil (6070, thanks to MW).

aa. **New Online Project** – when **Offline Project is opened** and user hits New Online Project, offer **option to Connect to PLC** with the currently opened Offline Project (6515).

bb. **Select PLC Connection** – when showing **New PLCs**, the ones found via Ethernet **provide the PLC's Ethernet (MAC) Address** in the Other column when it is different than the **PLC's Serial Number**. This occurs when connecting via an ECOM module instead of a built-in Ethernet port.

cc. **Select PLC Connection** – supports PC Ethernet Network Adapters that are configured with **multiple IP Addresses/Subnets** (thanks to JB).

dd. **Select PLC Connection** – when connecting to a New PLC that does not have an IP Configuration (out-of-box IP Address is 255.255.255.255), the **Configure New IP Settings** dialog provides an option to have the PLC use **DHCP** to obtain an IP Address (vs. assigning a static IP Address).

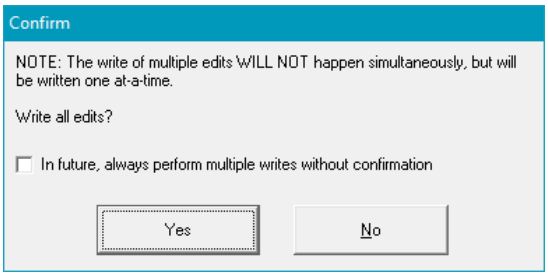
ee. New **System Status** Nicknames

ST38	$DumpToSecAdaptr		In BRX with BX-ECOMEX POM, when ST36 is ON ($EnableMsgDump), use this bit to select which Ethernet Port to broadcast the messages out of:
		0	Primary Port (IntEthernet)
		1	Secondary Port (ECOMEX POM)
DST61	$SysMsgLevel		ERR/MSG strings Report Level value: 0 – do not update ERR nor MSG 1 – update ERR only (default) 2 – update ERR and MSG
DST62	$Eth2IpAddress		IP Config status registers for ECOMEX
DST63	$Eth2Netmask		
DST64	$Eth2Gateway		
DST65	$Eth2DroppedPkts		Diagnostic registers for ECOMEX
DST66	$Eth2PktsReceivd		
DST67	$Eth2PktsSent		
DST68	$TLSTimeSlice		Time in MICROseconds allotted to a PLC scan for servicing TLS secure handshaking
DST69	$EIPAdaptrStatus		When a bit is ON, the corresponding EtherNet/IP Adapter Connection Block is being “scanned” by a remote Scanner; Bits 0-7 correspond to EtherNet/IP Server/Adapter Block #1 thru #8
DST70	$Eth2MACAddress		Last 4 bytes of ECOMEX MAC address

ff. **Launch Pad** – added **Open Dump File Folder** to the Applications group (6488).

gg. **Output Window** – no longer closes automatically if it is floating, it will only automatically close if it is docked (6231).

hh. **Data View** – ***Write All Edits*** message box informing user of it NOT being able to write all simultaneously has a **"don't ask again" checkbox** (6492):



ii. **Browse Videos** – added support for **Playlists** (see Keyword list).

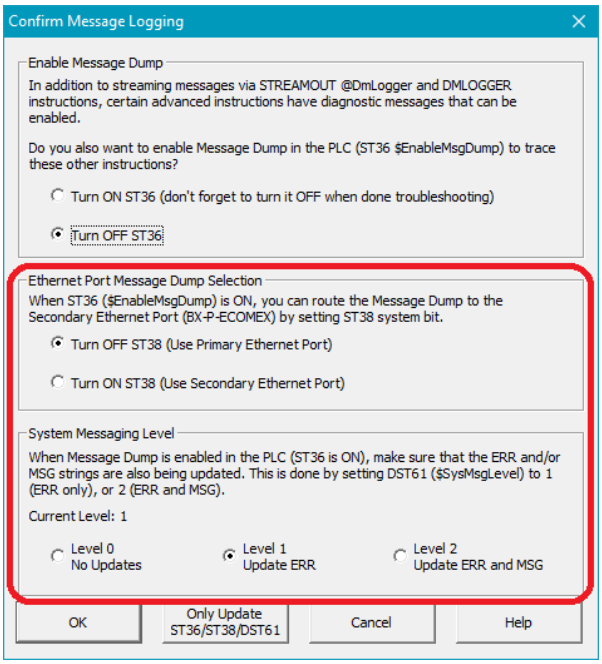
jj. **Browse PLC File System** – added **Help** button (5639).

kk. **Debug->Launch DmLogger**

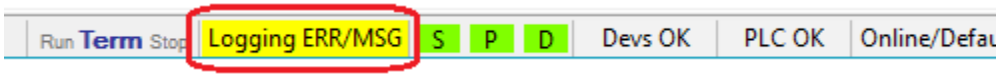
The **Confirm Message Logging** dialog supports the 2 new System BIT/DWORDs

ST38 ($DumpToSecAdaptr) - let you choose **which BRX Ethernet Port** to **dump** the system generated debug/error messages (Primary-OFF vs. Secondary-ON, 6585)

DST61 ($SysMsgLevel) ERR/MSG strings Report Level value (6461):
0 – do not update ERR nor MSG
1 – update ERR only (default)
2 – update ERR and MSG (useful for MQTT transaction analysis, however it also causes HEAVY CPU LOAD, so caveat emptor and remember to change it back to 1 or 0.



ll. **Status Bar** – added a **new panel** when connected online to a PLC, that shows status of **DST61 ($SysMsgLevel) and ST36 ($EnableMsgDump)** when either is NOT their default (defaults are ERR only, Message Dump OFF) (6508).



mm. **DMLoader** – lets you select the specific Network Interface Card (NIC) when connecting to your PLC

nn. **Cross Reference** – added support for Print Ranges (6581)

15. Adjusted Anomalies

a. Ladder View – High Speed I/O instructions editors' Configure HSIO Resource buttons go to the proper module specific resource configuration dialog (5889, 5965, 5999, 6439).

b. Ladder View – SR Shift Register Editor's Shift Register range description text field changed from 1 line to 2 lines (6458).

c. Ladder View – RAMPSOAK instruction's Monitor Values in Data View contains the Ramp Soak structure once (6441)

d. Ladder View – after Search/Replace, refresh Stage numbers in the Address margin (6518).

e. Ladder View – STREAMOUT's Flush INPUT Buffer checkbox enabled properly (6534).

f. Ladder View – MRX – Modbus Network Read instruction display no longer clips the Function Code parameter (6473).

g. Ladder View – New Instruction Toolbox one-time notification dialog no longer shows up off-screen, which was causing Designer appear to be locked up (6552, thanks to BC).

h. Ladder View – properly handle new heap-item name (instead of a new nickname) in RUN instruction vs. a new nickname.

i. Ladder View – display coils properly when part of rung with W-I-D-E boxes (6562; thanks JW).

j. Ladder View – EIPMSG – Send EtherNet/IP Message editor's On Success label no longer grays out inappropriately.

k. Ladder View – RX/WX – Do-more Network Read/Write properly shows the Element Picker button for On Success and On Error JMP to Stage option.

l. Ladder View – Replace dialog maintains proper Documentation behavior radio button as you add multiple replace items to the replace list (6353, thanks to JW).

m. Ladder View – Properly handles print pagination of tall box instructions like TDOPLS with 50+ steps (6256).

n. Ladder View – Replace properly handles "temporary string" parameter of SS0 utilized in newer instructions (6570).

o. Ladder View – JSONBUILD properly handles switching to Array Record Type after "Insert Structure Fields" was performed. Also disables the "Insert Structure Fields" button when Record Type is Array (6580).

p. Ladder View – Table-based instructions properly display columns when "Lengthy Instructions" Ladder Option is set to "Display Short Summary" (6590).

q. Ladder View – FILELOG handles ranged casts (6595).

r. Ladder View – When performing Past of Rungs or Code Block, show a Status dialog (6450, thanks to JW).

s. Ladder View – Drum instruction editor properly handles changing focus from the Mask or Step Preset field to the Output, Time, or Event fields (6451, thanks to CA).

t. Ladder View – User Data Type parameter limits its status width (2.8.3, 6623, thanks to GD).

u. Ladder View – COPY, CALL support copying Heap item to Heap item (2.8.3, 6622, thanks to M@F)

v. Ladder View – PWMOUT: Edit Device instruction tool works properly (2.8.3, 6613); parameters properly change when PWM configuration is modified or deleted (2.8.3, 6614).

w. Ladder View – String Script Editor properly handles unsupported Element types (2.8.3, 6618, thanks to RBP).

x. Ladder View – Print properly handles rungs with many rows (2.8.3, 6617, thanks to CW).

y. System Configuration – BX-HSIO module configuration dialog properly saves entered module configuration name (2.8.3).

z. System Configuration – Properly hide/disable EtherNet/IP Implicit Adapter fields and MQTT/FTP device creation for CPUs that do not support those features (2.8.3, 6610).

aa. System Configuration – maintain devices associated with modules that are being disconnected when you change the CPU type.

bb. System Configuration – BRX Analog Output dialog properly handles scaled values in Electrical mode (thanks to DS).

cc. System Configuration – properly disables the Enable Ethernet I/O Master checkbox when PLC is a non-Ethernet CPU.

dd. System Configuration – properly disables EtherNet/IP Server Block when unchecked.

ee. Update Operating System dialog –Version Details button properly goes to Help topic about Do-more Technology Version 2.8 (2.8.3, 6611).

ff. Memory View – Support Bit data blocks in addition to Numeric and Structure data blocks (2.8.3, 6612)

gg. Data View – Bit Display Settings for the individual graphics of a bit's ON/OFF states warns if BOTH are set to the "blank" graphic (6485).

hh. Trend View – changed ambiguous menu "Options" terminology to differentiate between the general View Options and the view's specific Configuration.

ii. Trend View – F1 Help button works in the Trend View Configuration dialog (6600).

jj. Trend View – changes to default History Size option propagates properly (6567, thanks to GD).

kk. Create Nickname – sets initial elements to be unused and w/o Nicknames (6549).

ll. Download Project to PLC dialog – word wrap in Project Notes edit field behaves properly (6605).

mm. Program Compare – no longer displays the Edge and Instruction IDs as part of the mnemonic when that option is turned off (6583, thanks to SM).

nn. I/O System View – properly displays Analog Output Scale details (6542).

oo. I/O System View – properly show warning state of analog modules

pp. I/O System View – properly link to online documentation and spec sheets based on part number (6603).

qq. I/O System View – properly handles changes to the I/O Configuration when online (6607).

rr. New Offline Project dialog's New Project Name/Browse buttons work properly (6555, thanks to FD).

ss. New Project – When creating a new Online or Offline project, use Window's %temp% folder when the specified *Projects* folder does not exist (6556).

tt. Open Project Files – properly report when attempting to open a "newer" versioned .dmd project file with an older version of Designer (6530).

uu. PLC Communication – enhanced Windows responsiveness during PLC read/write project operations (5772).

For details about updates for version 2.7 to 2.0, see this online document:

http://forum.hosteng.com/wndm/Updates_2_7.pdf

For details about updates for version 1.4 and earlier, see this online document:

http://forum.hosteng.com/wndm/Updates_1_4.pdf