
MCU900 family of Control Units

MCU900 Software changes from V2.14 to V3.00

Important Information : Please read in conjunction with product manual IP2030/IM



Level

INTRODUCTION

The software embedded in the MCU900 Series Control Units has been enhanced with new features. This new software is version V3.00.

1. Display Size

The main MCU900 display can now be selected to fill the entire display area. This function is selectable by the "Display Size" parameter (P574), offering options "Normal" or "Large".

- The default setting is "Large".
- Pressing any key will cause the display to revert to a 3-line display (Normal). Once a key has been pressed, continue as per Sections 1 through 7 of IP2040/QS. After no keypad action for 2 minutes the display will revert to Large size.
- The Display format can be changed to Normal using P574 (MAIN MENU/CONTROL UNIT OUTPUT / DISPLAY/ Display Size)
- This feature only operates with numerical values. It comprises a sign, 5 digits, decimal point and units. If the value is too large to display as 5 digits then it reverts to Normal size.

2. Menu Structure

The MCU900 HMI menu structure has been modified to make the most commonly used parameters more accessible from the SETUP menu. The revised sequence of options is:

- DUTY
- OUTPUT
- LOGGING (if an MCULOG or MCU90F)
- INPUT CHANNEL
- DIGITAL INPUT
- SYSTEM

(Previously: INPUT CHANNEL; DUTY (Mode); DIGITAL INPUT; OUTPUT; SYSTEM)

Note that the DUTY WIZARD will not proceed unless a transmitter is connected.

3. Additional Totaliser Units

Added Totaliser units of gallons x 10, gallons x 100, gallons x 1000.

4. Application/Duty: Flow Measurement

Additional open channel flow curves have been added.

4.1. V-notch (Triangular) Weir

MCU900 Series now incorporates calculation based on the Kindsvater Shen formula as specified in BS3680.

$$\text{Flow, } Q(m^3 / s) = C_e \times 8/15 \times \tan(A_r / 2) \times (2 \times g)^{0.5} \times (h + k_h)^{2.5}$$

The controller can be configured for use with V-notch weirs by selecting either V-Notch (5/2) or 20 point look-up or Kindsvater Shen in the FLOW WIZARD (via DUTY WIZARD).

If Kindsvater Shen is selected then it is only necessary to enter the angle of the 'V' in degrees.

4.2. Parshall Flumes

MCU900 Series can be easily configured for use with Parshall flumes by selecting Predefined Calc. in the FLOW WIZARD (via DUTY WIZARD).

1", 2", 3", 6", 9", 1', 1.5', 2', 3', 4', 5', 6', 8' and 10' Parshall flumes are available.

If a Parshall flume is selected via FLOW WIZARD, the choice of units offered is based on the input level units (e.g. Transmitter PV is in metres, then the flow units offered will be metric only).

If Predefined Calc. is selected you will be offered differing sized Parshall Flumes (as well as the other original OCF calculations).

The Parshall flume size is selected in Imperial units.

The appropriate conversion factors are already built into the MCU900 series software and will be applied by the Wizard to satisfy the User's requirements.

If a Parshall flume is selected via the menu (i.e. Ch1 I/P Profile – P113) then the parameters will be populated in imperial units assuming the input signal (transmitter PV) is in feet.

The Totaliser Factor & Totaliser Units will be automatically selected based on the flume size selected.

MCU900 can be configured for other, non-standard, Parshall flumes by selecting Flow Calculation and entering the k-factor & power. This may be done in FLOW WIZARD or directly into Profile (Ch1 P115).

5. Simulation (previously Autocycling)

Autocycling has been re-named as Simulation. In earlier versions of the MCU900 Series, Simulation was started and paused by pressing either the Up or the Down arrow key. This has now been improved such that the direction in which Simulation starts is determined by the arrow key pressed. When Simulation is active then it is paused by pressing either the Up or the Down arrow key.

6. Support for New Features of the MSP900GH and MSP400RH Transmitters

NOTE

This section should be read in conjunction with transmitter manuals IP2045/IM (MSP900GH) or IP2046/IM (MSP400RH) together with Technical Operator's Manual, IP2030/OM (MCU900 series).

Latest generation MSP900GH and MSP400RH Series transmitters (V3.1 and later) have the ability to read target information and then use that information to aid configuration (Convenience Commands).

They can also store information relating to a maximum of 4 echoes & then reject all or some of those echoes (Tank Mapping & Echo Rejection Commands)

MCU900 series with version 3.00 or later have additional commands and parameters to access these features.

The menu structure presented when connected to an MSP900GH and MSP400RH Series Ultrasonic Level Transmitter has been extended to support new features in the transmitters. See also Appendix 1.

6.1 Convenience Commands

6.1.1. Present Depth

Traditionally, users set the Bottom Reference by entering the specific value they require. In some circumstances the User does not know that value but he does know the present depth of liquid. Sending the "Present Depth" Command causes the transmitter to adjust its Bottom Reference parameter such that its level reading equals the value entered by the User.

This is the transmitter PV. It is the liquid depth relative to the current set Bottom Reference

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6.1.2. Set as Empty

This loads the current target distance as the new Bottom Reference resulting in *Present Depth* becoming 0.

6.1.3. Distance Offset (P060) - Default value 0.0000

Bottom Reference is normally referenced to the transmitter face.

Entering a Distance Offset (positive or negative), will move that reference point down (or up) by this value. It is entered in Base Units (metres or feet or inches).

This will change the transmitter Third Variable (TV/D902) but not diagnostic parameter, Distance (D910)

6.1.4. Level Offset (P069) - Default value 0.0000

Transmitter Primary Variable (level) is normally referenced to the Bottom Reference.

Entering a Level Offset (positive or negative), will move the PV reference point up (or down) by this value. It is entered in Base Units (metres or feet or inches).

6.1.5. Lower Blanking (P063) - Default value 0.0000

(This parameter is accessed through Tx1 : MSP900 (or MSP400)/ENGINEERING)

This command behaves in a similar manner to Upper Blanking (formerly Blanking) except that it is referenced to the Bottom Reference. The transmitter is blind to echoes within this region.

With the default value of 0, the transmitters are actually able to process echoes up to a maximum of 0.5m beyond Bottom Reference.

6.2. Tank Mapping and False Echo Rejection

These commands are accessed through:

Tx1 : MSP900 (or MSP400)/ENGINEERING/FALSE ECHO ACTION

6.2.1. Clear False Echoes (P089)

This can be used to delete all or individual mapped echo information.

From within P089, Edit (press Enter). A black rectangle will appear and the Edit will have changed to Save.

Press either the Up or Down arrow to select 'All' or 'False Echo 1' (or 2 or 3 or 4).

Press Enter to send the command.

6.2.2. Learn a False Echo

If the transmitter has picked up on an incorrect target echo, this false echo can be rejected using this command.

Press Start (Enter) to send the command. This process may take up to 30 seconds to action.

This command will reject the current echo (even if it is actually the correct echo).

6.2.3. Stored FALSE ECHO DATA parameters

These parameters are accessed through:

Tx1 : MSP900 (or MSP400)/ENGINEERING/FALSE ECHO DATA

This takes you to data relating to the size and position (distance) of up to 4 echoes:

False Echo D1 (P081)	Echo 1, distance
False Echo S1 (P082)	Echo 1, size
False Echo D2 (P083)	Echo 2, distance
False Echo S2 (P084)	Echo 2, size
False Echo D3 (P085)	Echo 3, distance
False Echo S3 (P086)	Echo 3, size
False Echo D4 (P087)	Echo 4, distance
False Echo S4 (P088)	Echo 4, size
No. False Echo (D980)	Number of stored echoes

It is possible to delete individual echoes and substitute others by editing 'distance' and 'size' data to 0 and then pressing Save.

6.2.4. Auto Tank Mapping

This command is to be used in an empty tank.

First set the Bottom Reference and Bottom Blanking (if used).

Next start AUTO TANK MAP. This may take up to 40 seconds to action this command.

Following the use of either of the above commands (LEARN FALSE ECHO or AUTO TANK MAP), the stored data can be viewed through FALSE ECHO DATA.

6.3. Advanced Parameters

These parameters are accessed through:

Tx1 : MSP900(or MSP400)/ENGINEERING/ADVANCED

The full list of ADVANCED parameters is:

Tx Pwr Control (P040)	*
Pulse Repeat (P041)	
Echoes Needed (P042)	
Thresh 1 Time (P043)	*
Target Pulses (P044)	
Target Freq (P045)	
Thresh 1 Size (P048)	*
Spike Reject (P049)	

* - Indicates new parameter

6.3.1. Tx Pwr Control

This is used to control the ultrasonic signal power . The default setting is 'Enable'

6.3.2. Thresh 1 Time/Thresh 1 Size

Default: 2.9ms and 4%

These parameters can be used together and to overcome unwanted echoes in the near zone.

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Appendix 1 – MSP900 Parameter Structure

The table shows the parameter structure for the MSP900 within the MCU900

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Par No.	Parameter Name	Units												
SETUP	DUTY			P010	Bottom Reference (Tank Height)	as base units												
					Present Depth	as base units												
					Set as Empty	-												
				P011	Tank Shape (Tank Type)	-												
				P060	Distance Offset	as base units												
				P069	Level Offset	as base units												
				P013	PV Scale Factor	-												
				P014	Profile Height	as base units												
				NLP CURVE			P030	Profile Point 1	%									
							P031	Profile Point 2	%									
							P032	Profile Point 3	%									
							P033	Profile Point 4	%									
							P034	Profile Point 5	%									
							P035	Profile Point 6	%									
							P036	Profile Point 7	%									
							P037	Profile Point 8	%									
							P038	Profile Point 9	%									
							P039	Profile Point 10	%									
				IDENTITY			P000	Message	-									
							P001	Tag	-									
							P002	Descriptor	-									
				PV CALC				P012	Primary Variable Units (PV Units)	-								
				OUTPUT	CURRENT			P015	Upper range value	as PV units								
								P016	Lower range value	as PV units								
								P020	Damping	sec								
								RELAYS	RELAY 1	P070	Relay 1 mode	-						
										P071	Relay 1 PV ON Point	as PV units						
										P072	Relay 1 PV OFF Point	as PV units						
									RELAY 2	P073	Relay 2 mode	-						
										P074	Relay 2 PV ON Point	as PV units						
										P075	Relay 2 PV OFF Point	as PV units						
								ENGINEERING				P021	LE Delay	sec				
				P022	LE Action	-												
				P023	Upper Blanking	as base units												
				P063	Lower Blanking	as base units												
				P024	Speed of Sound	base units/s												
				P025	Temperature	C or F												
				P026	Set Threshold	%												
				ADVANCED								P040	Transmit Power Control	-				
												P041	Pulse Repetition	sec				
												P042	Echoes Needed	-				
												P043	Threshold 1 Time	ms				
												P044	Target Pulses	-				
												P045	Target Frequency	kHz				
												P048	Threshold 1 Size	%				
												P049	Spike Rejection	-				
												FALSE ECHO DATA				P081	False Echo D 1	as base units
																P082	False Echo S 1	%
				P083	False Echo D 2	as base units												
				P084	False Echo S 2	%												
				P085	False Echo D 3	as base units												
				P086	False Echo S 3	%												
				P087	False Echo D 4	as base units												
				P088	False Echo S 4	%												
				D980	No. of False Echoes Stored	-												
				P089	Clear False Echoes	-												
				SYSTEM									LEARN FALSE ECHO	-				
													AUTO TANK MAP	-				
													SIMULATION	-				
													RESTART DEVICE	-				
													LOAD DEFAULTS	-				
									FACTORY USE	-								
									Base Units	-								
								FIXED				P004	Final Assembly Number	-				
												P005	Serial Number	-				
												P970	Transducer material	-				
												HART				D949	Model Code	-
																D950	HART Device Code	-
																D951	Poll Address	-
																D952	Hardware Revision	-
																D953	Software Revision	-
																D960	Manufacturer	-
																D961	Unique ID	-

Interim Manual Supplement

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	Menu Level 2	Menu Level 3	Menu Level 4	Par No.	Parameter Name	Units	
MONITOR	READINGS	VARIABLES		D900	Primary Variable	as PV units	
				D901	Level (SV)	base units	
				D902	Distance (TV)	base units	
				D903	Transducer Temperature	C or F	
				D906	Current output	mA	
			D905	% Current Output	%		
			D908	Relay Status	-		
		DIAGNOSTICS			D910	Distance to Target	base units
					D911	Echo Size	%
				D912	Echo Success Rate	%	
				D913	Target Echoes	-	
				D914	Speed of Sound	base units/s	
				D915	Temperature SoS Calc	C or F	
			OPERATION		D916	Transducer Frequency	kHz
					D917	Threshold in Use	%
					D918	Pulses in Use	-
					D919	Transmit Power	-
			STATUS		D991	Device Status Group 1	-
					D992	Device Status Group 2	-
					D993	Device Status Group 3	-
					D994	Device Status Group 4	-
					D995	Device Status Group 5	-
					D996	Device Status Group 6	-
			HISTORY		P003	Date	dmy
					P046	Maximum Temperature	°C
				P047	Minimum Temperature	°C	



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