

¹/₁₆ - ¹/₈ - ¹/₄ DIN LIMIT CONTROLLERS CN2516, CN2508, CN2504

CAUTION: Installation should be only performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

1. INSTALLATION

The models covered by this manual have three different DIN case sizes (refer to section 9). Some installation details vary between models. These differences have been clearly shown

Note: The functions described in sections 2 thru 8 are common to all models. Installing Option Modules



To access module A, first detach the PSU and CPU boards from the front by lifting first the upper, and then lower mounting struts. Gently separate the boards.

- Plug the required option modules into the correct connectors, as shown below.
- b. Locate the module tongues in the corresponding slot on the opposite board.
- Hold the main boards together while relocating back on the mounting struts. Replace the instrument by aligning the CPU and PSU boards with their guides d in the housing, then slowly push the instrument back into position. Note: Option modules are automatically detected at power up.

Option Module Connectors

¹/₁₆ Din Size Instruments





Rear Terminal Wiring

USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT) Single Strand wire gauge: Max 1.2mm (18SWG)

¹/₁₆ Din Size Instruments



¹/₈ & ¹/₄ Din Size Instruments



These diagrams show all possible option combinations. The actual connections required depends on the exact model and options fitted.

CAUTION: Check information label on housing for correct operating



voltage before connecting supply to Power Input Fuse: 100 – 240V ac – 1amp anti-surge 24/48V ac/dc – 315mA anti-surge

Note: At first power-up the message Loco ConF is displayed, as described in section 6 of this manual. Access to other menus is denied until configuration mode is completed

2. SELECT MODE

Select mode is used to access the configuration and operation menu functions. It can be accessed at any time by holding down and pressing a. In select mode, press or to choose the required mode, press to enter. An unlock code is required to prevent unauthorised entry to Configuration, & Setup modes. Press or to enter the unlock code, then press to proceed.

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	OPtr	SLCE	Normal operation	None
Set Up	SEFL	SLCE	Tailor settings to the application	10
Configuration	EonF	SLCE	Configure the instrument for use	20
Product Info	inFo	SLCE	Check manufacturing information	None
lote: The instrument will always return automatically to Operator mode if				

there is no key activity for 2 minutes.

3. CONFIGURATION MODE

First select Configuration mode from Select mode (refer to section 2). Press \bigcirc to scroll through the parameters, then press \bigtriangleup or \bigtriangledown to set the required value. Press \bigcirc to accept the change, otherwise parameter will revert to previous value. To exit from Configuration mode, hold down \bigcirc and press \bigtriangleup , to return to Select mode.

Note: Parameters displayed depends on how instrument has been configured. Refer to user guide (available from your supplier) for further details. Parameters marked * are repeated in Setup Mode.

Parameter		Lower Display	Upper Display	Adjustment rang	je & De	scription	Default Value
Input Range/	Input Range/Type		See following table for possible codes		JC		
Code	Input Typ Range	be &	Code	Input Type & Range	Code	Input Typ Range	e &
ЪС	Ь[В: 100 - 1824 °С		LE	L: 0.0 - 537.7 °C		PtRh20% v	's 40%:
ЪF	B: 211 - 33	15 °F	LF	L: 32.0 - 999.9 °F	PCAP	32 - 3362 °	F
55	C: 0 - 2320	°C	nc			9 - 800 °C	
EF	C: 32 - 420	8 °F	nF	N: 32 - 2551 °F PEF Pt100: -328 - 1472		8 - 1472 °F	
JL	J: –200 - 1	200 °C	٢C	R: 0 - 1759 °C	PE.C	Pt100: -12	8.8 - 537.7 °C
J۶	J: -328 - 2	192 °F	٢F	R: 32 - 3198 °F	PE,F	Pt100: -19	9.9 - 999.9 °F
J.L	J: –128.8 ·	537.7 °C	50	S: 0 - 1762 °C	05-0	0 - 20 mA [C
J,F	J: –199.9 ·	999.9 °F	SF	S: 32 - 3204 °F	4_20	4 - 20 mA [C
۲٢	K: –240 - 1	373 °C	ĿΕ	T: –240 - 400 °C	0_50	0 - 50 mV [00
۲F	K: -400 - 2	2503 °F	Ł۶	T: –400 - 752 °F	10.50	10 - 50 mV	DC
P,E	K: –128.8 -	537.7 °C	E.C	T: -128.8 - 400.0 °C	0.5	0 - 5 V DC	
РF	K: –199.9 -	999.9 °F	ЪF	T: –199.9 - 752.0 °F	1_5	1 - 5 V DC	
LE	L: 0 - 762 °	С	payr	PtRh20% vs. 40%:	0_ 10	0 - 10 V DO)
LF	L: 32 - 140	3 °F		0 - 1850 °C	0 _S	2 - 10 V DO	>
Note: I	Decimal p	oint sho	wn in ta	ble indicates temp	perature	resolutio	n of 0.1°
Param	eter	Lower Display	Upper Display	Adjustment rang	je & De	scription	Default Value
Scale F	Range	ruL	S	Scale Range Lower Limit +100 to Bange Maximum			Range max
Scale F	Range			Range Minimu	um to		Range min
Lower I	Limit	rii	5	Scale Range Upper	Limit -1	00	(Linear=0)
Decima positior	Decimal point position dPo5		D=xx	xx, I=xxx.x, Z=x non-temperature ra	X.XX, 3 anges or	= X.XXX nly)	ł
Proces Offset	s Variable	OFFS	(see	±Span of controller (see CAUTION note at end of section)			0
Limit A	ction	[tecl	н,	High Limit relay is e process "safe" (P	Limit. nergised / < Limit	d when t Setpoint)	H,
			Lo	Low L Limit relay is e process "safe" (P	Limit. nergised / > Limit	d when t Setpoint)	
Setpoir Limit	it Upper	SPul	Current Setpoint to Scale Range maximum			R/max	
Setpoint Lower SPL		SPLL	Scale Range minimum to Current Setpoint			R/min	
			P_H Process High Alarm				
	-		P_Lo	P_Lo Process Low Alarm			
Alarm 1 l ype		RLR I	dE Deviation Alarm			P_H 1	
			Band Alarm				
High Al	arm 1	P58 1				Bange Max	
value*			Scaled Range Minimum to scaled Range Maximum in display units) av unite	Trange Max	
value*		PLAI			ay units	Range Min	
Band Alarm 1 value*		1 LSD to span from setpoint in display units		play units	5		
Dev. Alarm 1 dRL I		+/- Span from setpoint in display units		y units	5		
Alarm 1 Hysteresis*		RHY I	1 LSD to full span in display units		1		
	-						

Parameter	Lower Display	Upper Adjustment range & Description		Default Value	
Alarm 2 Type*	ALA2	,		P_Lo	
High Alarm 2	0103			Banga May	
value*	rnnc			naliye wax	
Low Alarm 2	PLA2		Range Min		
Rand Alarm 2					
value*	PHTC		5		
Dev. Alarm 2	48I 2			ç	
Value*	0				
Alann 2 Hysteresis*	8H75				
Tyotoroolo		LUJF	Limit Output Relay		
		A L_d	Alarm 1, Direct		
		A I_r	Alarm 1, Reverse		
		b_SR	Alarm 2, Direct		
		A2_r	Alarm 2, Reverse		
		Or_d	Logical Alarm 1 OR 2, Direct	R I_d	
Output 2 Usage	USE2	Or_r	Logical Alarm 1 OR 2, Reverse		
		Ad_d	Logical Alarm 1 AND 2, Direct		
		Ad_r	Logical Alarm 1 AND 2, Reverse		
		An_d	Limit Annunciator, Direct		
		An_r	Limit Annunciator, Reverse		
		rEtS	Retransmit Limit SP Output	-660	
		rEtP	Retransmit PV Output		
		0_5	0 to 5 V DC output 1		
Linear Output 2		0_ 10	0 to 10 V DC output		
Range	F765	2_ 10	2 to 10 V DC output	0_ 10	
0		0_20	0 to 20 mA DC output		
-		4_20	4 to 20 mA DC output		
Retransmit	20	-1999 to 9999 (display value at which output		Pango may	
maximum	FOCH	(display value at which output will be maximum)		nange max	
Retransmit	_	-1999 to 9999			
Output 3 Scale	roZL	(display value at which output		Range min	
	11663	will be minimum)			
Linear Output 3	0303		As for output 2	n 1_0	
Range	FAb3		As for output 2	0_ 10	
Retransmit			-1999 to 9999		
Output 3 Scale	ro3H	(0	display value at which output	Range max	
Retransmit			-1999 to 9999		
Output 3 Scale	ro3L	(0	display value at which output	Range min	
minimum			will be minimum)	_	
	d iSP	EnRb	PV is visible in Operator mode		
Display Strategy		d ,5R	PV not visible in Operator mode	EnAb	
		SAFE	Displays SHFL in Operator mode		
		פכר ו			
Serial			Modbus with no parity		
Communications	Prot		Modbus with Even Parity	ՐԴԵո	
Protocol		1 10C	Modbus with Odd Parity		
		- 100 	1.2 kbps		
Serial Communications	bAud	24	2.4 khns		
		Ч.Я	4.8 khns	ЧА	
Bit Rate		9.6	9.6 khne		
		19,2	19.2 khne		
Comms Address	Bdde	1 to 055 (Medbus) d to 00 (A001)			
		1 to 255 (Modbus), 1 to 99 (ASCII)		· · · · · · · · · · · · · · · · · · ·	
Comms Write	CoEn		Read only	60	
Configuration	<u></u>	Read Only			
Lock Code		U to 9999			

Notes: Output 1 is always a Latching Limit Relay output.

If Option Slot A has the Digital Input module fitted, this always functions as a Remote Reset, duplicating the function of the Reset) key

As these functions cannot be changed, no Configuration menus are required.



CAUTION: Process Variable Offset can be used to modify the measured value to compensate for probe errors. Positive values increase the reading, negative values are subtracted. This parameter is effectively, a calibration adjustment and MUST be used with care. There is no front panel indication of when this parameter is in use.

SETUP MODE

Note: Configuration must be completed before adjusting Setup parameters. First select Setup mode from Select mode (*refer to section 2*). The Setup LED will light while in Setup mode. Press 🔾 to scroll through the parameters, Then press \triangle or \bigtriangledown to set the required value. To exit from Setup mode, hold down \bigcirc and press \triangle to return to Select mode.

Note: Parameters displayed depends on how instrument has been configured.

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
Limit Setpoint value	SP	Scaled Range Minimum to scaled Range Maximum	R/max if [trL=H i R/min if [trL=Lo
Limit Hysteresis	HYSE	1 LSD to full span in display units, on the safe side of the limit SP	
Input Filter Time Constant	F iLE	OFF or 0.5 to 100.0 secs (see CAUTION note below)	0.5
High Alarm 1 value	PhR I Scaled Range Minimum to		R/max
Low Alarm 1 value	PLR I	scaled Range Maximum	R/min
Deviation Alarm 1 Value	dRL I	±Span from SP in display units	5
Band Alarm 1 value	bal I	1 LSD to span from setpoint	5
Alarm 1 Hysteresis	AHY I	1 LSD to full span in display units	
High Alarm 2 value	2R49	Scaled Range Minimum to	R/max
Low Alarm 2 value	PLR2	scaled Range Maximum	R/min
Deviation Alarm 2 Value	SJAP	±Span from SP in display units	5
Band Alarm 2 value	PAr5	1 LSD to span from setpoint	5
Alarm 2 Hysteresis	8H75	1 LSD to full span in display units	1
Setup Lock Code	SLoc	0 to 9999	10
Note: Operator mode screens follow, without exiting from Setup mode.			

CAUTION: An excessively large filter time could significantly delay detection of a limit condition. Set this value to the minimum required

to remove noise from the process variable

5. PRODUCT INFORMATION MODE

First select Product information mode from Select mode (refer to section 2). Press Sto view each parameter. To exit from Product Information mode, hold down i and press i to return to Select mode. Note: These parameters are all read only.

Parameter	Lower Display	Upper Display	Description	
Input type	In_ I	Uni	Universal input	
Option 1 type (fixed)	0Pn I	- ሬ ሃ	Latching Limit Relay	
		nonE	No option fitted	
Onting 0 module type	02-20	- ሬ ሃ	Relay output	
fitted		SSr	SSR drive output	
intou		5	Triac output	
		Lin	Linear DC voltage / current output	
		nonE	No option fitted	
Onting 0 module type		- ሬ ሃ	Relay output	
fitted	0Pn3	SSr	SSR drive output	
intou		Lin	Linear DC voltage / current output	
		dc24	Transmitter power supply	
Auguilians Ontion A	0PnR	nonE	No option fitted	
module type fitted		r485	RS485 communications	
		יטיף	Digital Input for remote reset	
Firmware type	Fեմ	Value displayed is firmware type number		
Firmware issue	155	Value displayed is firmware issue numb		
Product Revision Level	PrL	Value displayed is Product Revision leve		
Date of manufacture	dОмт	Manufacturing date code (mmyy)		
Serial number 1	Sn I	First four digits of serial number		
Serial number 2	5-2	Middle four digits of serial number		
Serial number 3	5-3	Last four digits of serial number		

6. ERROR/FAULT INDICATIONS

Parameter	Upper Display	Lower Display	Description
Instrument parameters are in default conditions	Goto	ConF	Configuration & Setup required. This screen is seen at first turn on, or if hardware configuration has been changed. Press O to enter the Configuration Mode, next press or v to enter the unlock code number, then press O to proceed
Input Over Bange	CHHJ	Normal	Process variable input > 5% over-range
Input Over Hange	Normal	CHHJ	as above if Display Strategy = SAFE
Input Under	ננגט	Normal	Process variable input > 5% under-range
Range	Normal	CLL3	as above if Display Strategy = SRFE
Input Sensor Break	OPEN	Normal	Break detected in process variable input sensor or wiring
	Normal	OPEN	as above if Display Strategy = SAFE
Option 1 Error		0Pn I	Option 1 module fault
Option 2 Error		02-20	Option 2 module fault
Option 3 Error	Err	0Pn3	Option 3 module fault
Option A Error		0PnA	Option A module fault
Option B Error		ОРль	Option B not used on Limit Controllers this error is shown if any module is fitted

7. OPERATOR MODE

This mode is entered at power on, or accessed from Select mode (see section 2). Note: All Configuration mode and Setup mode parameters must be set as required before starting normal operations.

Press of to scroll through the parameters.

Upper Display	Lower Display	Display Strategy and When Visible	Description
PV Value	Limit SP Value	d ·SP = EnAb (initial screen)	PV and Limit Setpoint values Read only
Limit SP Value	(Blank)	d ·SP = d ·SR (initial screen)	Limit Setpoint value <i>Read only</i>
SAFE or rSEL	<i>(Blank)</i> or PV Value	d ·SP = SAFE . (Initial Screen)	Displays rSEt and PV if Limit Output is active or SRFE and <i>blank</i> if not active. <i>Read only</i>
High Limit Hold	н "На	[trl=Hı	Highest PV value since this parameter was last reset. To reset, press ♥ for 5 seconds, display = when reset
Low Limit Hold	LoHd	[trl = Lo	Lowest PV value since this parameter was last reset. To reset, press of for 5 seconds, display = when reset
Exceed Time Value	٤ı	Always available Format <i>mm.ss to 99.59</i> <i>then mmm.s</i> (10 sec increments) Shows ['HH] if ≥999.9	Accumulated time of Limit SP exceed conditions since this parameter was last reset. To reset, press of for 5 seconds, display = when reset
Active Alarm Status	ALSE	When one or more alarms are active. ALM indicator will also flash	Alarm 2 active المحك الص Alarm 1 active Annunciator active

Exceed Condition

An Exceed Condition is when the Process Variable exceeds the Limit Setpoint value (i.e. PV > SP when set for high limit action, PV < SP for low limit action). The LED is on during this condition, and is extinguished once it has passed. Limit Output Function

Limit Output relay(s) de-energise whenever an Exceed condition occurs, causing the process to shut down. The LED is on when the relay is de-energised. The relay remains latched off even if the Exceed condition is no longer present. Only giving a reset instruction (after the exceed condition has passed) will reenergise the relay, allowing the process to continue. The LED then turns off. Limit Annunciator Outputs

An Annunciator output will activate when an Exceed condition occurs, and will remain active until a reset instruction is received, or the Exceed condition has passed. Unlike the Limit Output, an Annunciator can be reset even if the Exceed condition is present. When an Annunciator is active, the W LED will flash and the Alarm Status screen is available

Resetting Limit Outputs & Annunciators

A reset instruction can be given by pressing the key, via the Digital Input (if fitted) or via a Comms command if an RS485 Communications module is fitted. Annunciators will deactivate. Limit Outputs will only re-energise if the Exceed condition has passed.

CAUTION: Ensure that the cause of the Exceed condition has been rectified before resetting the Limit Output.

8. SERIAL COMMUNICATIONS

Refer to the full user quide (available from your supplier) for details.

UNIVERSAL INP	UT
Thermocouple Calibration:	±0.1% of full range, ±1LSD (±1°C for Thermocouple CJC). BS4937, NBS125 & IEC584.
PT100 Calibration:	±0.1% of full range, ±1LSD. BS1904 & DIN43760 (0.003850/0/°C)
DC Calibration:	±0.1% of full range. ±1LSD.
Sampling Rate:	4 per second.
Impedance:	>10M Ω resistive. except DC mA (5 Ω) and V (47k Ω).
Sensor Break Detection:	Thermocouple, RTD, 4 to 20 mA, 2 to 10V and 1 to 5V ranges only. Limit outputs turn off (goes into Exceed condition), high alarms activate for thermocouple/RTD sensor break, low alarms activate for mA/V DC sensor break.
Isolation:	Isolated from all outputs (except SSR driver). Universal input must not be connected to operator accessible circuits if relay outputs are connected to a hazardous voltage source. Supplementary insulation or input grounding would then be required.
DIGITAL INPUT	
Volt-free(or TTL):	Open(2 to 24VDC) =No Reset. Closed(<0.8VDC) = Reset (edge triggered).
Isolation:	Reinforced safety isolation from inputs and other outputs.
OUTPUTS	
Limit Relay	
Contact Type & Rating:	Latching limit control relay. Single pole double throw (SPDT); 5A resistive at 120/240VAC. Slot 1 position fixed for this function, optional function for Slot 2 & 3 relay modules,
Lifetime:	>100,000 operations at rated voltage/current.
Isolation:	Basic Isolation from universal input and SSR outputs.
Alarm Relays	
Rating:	Siot 2 or 3 position non-latching alarm relay. Single pole double throw (SPDT); 2A resistive at 120/240VAC
Lifetime:	>500,000 operations at rated voltage/current.
isolation:	Basic isolation from universal input and SSR outputs.
SSR Driver	
Isolation:	SSR unve vollage >10V into 5002 min.
Triac	Not isolated norm universal input of other Soft univer outputs.
Operating Voltage:	20 to 280Vrms (47 to 63Hz).
Current Rating:	0.01 to 1A (full cycle rms on-state @ 25°C); derates linearly above 40°C to 0.5A @ 80°C.
Isolation:	Reinforced safety isolation from inputs and other outputs.
DC	
Resolution:	8 bits in 250mS (10 bits in 1s typical, >10 bits in >1s typical).
Isolation:	Reinforced safety isolation from inputs and other outputs.
Transmitter PSU	
Power Rating:	20 to 28V DC (24V nominal) into 910Ω minimum resistance.
Isolation:	Reinforced safety isolation from inputs and other outputs.
SERIAL COMMU	NICATIONS
Physical:	RS485, at 1200, 2400, 4800, 9600 or 19200 bps.
Protocols:	Selectable between Modbus and West ASCII.
Isolation:	Reinforced safety isolation from all inputs and outputs.
OPERATING CO	NDITIONS (FOR INDOOR USE)
Ambient Temperature:	0°C to 55°C (Operating), -20°C to 80°C (Storage).
Relative Humidity:	20% to 95% non-condensing.
Supply Voltage and Power:	100 to 240VAC ±10%, 50/60Hz, 7.5VA (for mains powered versions), or 20 to 48VAC 50/60Hz 7.5VA or 22 to 65VDC 5W (for low voltage versions).
ENVIRONMENT	AL.
Standards:	CE, UL, ULC & FM 3545, 1998
EMI:	Complies with EN61326 (Susceptibility & Emissions).
Safety	Complies with EN61010-1 & UL3121.
Front Panel Sealing:	To IP66 (IP20 behind the panel).

9. SPECIFICATIONS

PHYSICAL

Front Bezel Size: $\frac{1}{16}$ Din = 48 x 48mm, $\frac{1}{8}$ Din = 96 x 48mm, $1/_{4}$ Din = 96 x 96mm Depth Behind Panel: $\frac{1}{_{16}}$ Din = 110mm, $\frac{1}{_8}$ & $\frac{1}{_4}$ Din = 100mm. Weight: 0.21kg maximum.

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Managed by the United Kingdom Office

Toll-Free: 0800 466 342 TEL: +33 (0) 161 37 29 00 FAX: +33 (0) 130 57 54 27 e-mail: sales@omega.fr Germany/Austria:

Daimlerstrasse 26

D-75392 Deckenpfronn, Germany Toll-Free: 0800 6397678 TEL: +49 (0) 7056 9398-0 FAX: +49 (0) 7056 9398-29 e-mail: info@omega.de Mexico/Latin Ameica: En Español: 001 (203) 359-7803 FAX: 001 (203) 359-7807

e-mail: espanol@omega.com

United Kingdom: ISO 9001 Certified OMEGA Engineering Ltd. River Bend Technology Centre Northbank Irlam, Manchester M44 5BD United Kingdom Toll-Free: 0800-488-488 TEL: +44 (0) 161 777-6611 FAX: +44 (0) 161 777-6622 e-mail: sales@omega.co.uk

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WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one** (1) **year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product. If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue

an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having beer imms; implyible replan; or ulidatum/labe inculuated in this work is a force in a erune anoverse evente but intention the intention of the intention of the erune and the intention of the erune and th

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RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(5) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGAS CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit. LEOR NON-WARRANTY REPAIRS, consult OMEGA for

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting

OMEGA: 1. Purchase Order number under which the product

- vas PURCHASED.
- Wash FURCHASED,
 2. Model and serial number of the product under warranty, and
 3. Repair instructions and/or specific problems relative to the product.

current repair charges. Have the following information available BEFORE contacting OMEGA: 1. Purchase Order number to cover the COST of the

- 2. Model and serial number of the product, and 3. Repair instructions and/or specific problems relative to the product.

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TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire Th
- Panels & Assemblies Wire: Thermocouple, RTD & Thermistor Calibrators & Ice Point References Recorders, Controllers & Process Monitors
- Infrared Pyr

PRESSURE, STRAIN AND FORCE

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For immediate technical or application assistance: