



Agilent TwisTorr 305 FS Remote Controller

User Manual



Notices

Manual Part Number

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Operating Temperature

Operating Temperature: +5°C ÷ +45°C
Storage Temperature: -20°C ÷ +70°C

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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Informazioni su questo manuale

Validità

Questo manuale elenca le istruzioni per gli utenti del TwisTorr 305 FS Remote Controller, con particolare riferimento alle nozioni relative a sicurezza, funzionamento e manutenzione di primo livello, limitatamente alle operazioni di manutenzione di cui l'utente è responsabile.

Le operazioni di manutenzione, illustrate nelle sezioni specifiche, con disposizioni specifiche relative al livello più elevato di manutenzione (personale appositamente addestrato per le operazioni di manutenzione) non devono essere eseguite dall'utente.

Per una corretta installazione e avvio/arresto, consultare il paragrafo "Installazione". Per un uso tecnico più dettagliato, consultare il capitolo "Technical Information".

NOTA

- 1** Questo manuale contiene informazioni utili affinché tutto il personale che utilizza il TwisTorr 305 FS Remote Controller possa utilizzarla in sicurezza e garantire la perfetta efficienza, per tutta la sua durata.
- 2** Conservare questo manuale, insieme a tutte le pubblicazioni ad esso correlate, in un luogo accessibile, conosciuto da tutti gli operatori/personale di manutenzione.

Definizioni e terminologia

Definizione di Attenzione, Avvertenza e Nota

Alcuni riferimenti importanti di questo manuale sono evidenziati e incorniciati in colori contrastanti.

ATTENZIONE I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

AVVERTENZA I messaggi di avvertenza attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.



NOTA Le note contengono informazioni importanti e forniscono maggiori dettagli su passaggi specifici.

Simboli di avvertenza

Di seguito si riporta un elenco di simboli che vengono visualizzati insieme agli avvisi del TwisTorr 305 FS Remote Controller. Viene mostrato anche il pericolo che descrivono.

Un simbolo triangolare indica un'avvertenza. I significati dei simboli che possono apparire accanto alle avvertenze nella documentazione o sullo strumento stesso sono i seguenti:



Presenza di tensioni pericolose



Pericolo generico



Dichiarazione Europea di Conformità



Sito di produzione



Rifiuti di Apparecchiature Elettriche ed Elettroniche



Waste Electrical and Electronic Equipment



Certificazione RoHS China



Marcatura UK CA

Istruzioni per l'uso

Il seguente simbolo può essere usato sulle etichette di avvertenza attaccate allo strumento. Quando viene visualizzato questo simbolo, consultare il relativo manuale operativo o di manutenzione per la procedura corretta a cui fa riferimento tale etichetta di avvertenza.



I seguenti simboli appaiono sullo strumento per vostra informazione.

	Pericolo generico
	Presenza di tensioni pericolose
	Certificazione CE
	Certificazione CSA
	Certificazione RoHS China
	Waste Electrical and Electronic Equipment
	UK CA Marking

Sicurezza

Questa sezione contiene le informazioni, prescritte dalla Direttiva bassa tensione 2015/14/30 CE, che sono essenziali per la conformità e il rispetto delle norme di sicurezza sia in generale che in relazione all'uso specifico del prodotto.

La mancata osservanza di queste istruzioni e delle altre istruzioni contenute nel presente manuale può rendere inefficaci le condizioni di sicurezza previste in fase di progettazione e causare incidenti a chi utilizza il prodotto.

Agilent Technologies declina ogni responsabilità per danni al prodotto o per la sicurezza fisica dell'operatore o di terzi, derivanti dal mancato rispetto delle norme di sicurezza indicate nella documentazione tecnica.

Uso corretto

Questo manuale contiene importanti avvertenze e istruzioni di sicurezza da osservare affinché l'unità funzioni in sicurezza.

Il prodotto descritto in questo manuale è destinato esclusivamente all'ambito specificato nelle istruzioni. Il manuale fornisce inoltre indicazioni relative ai requisiti essenziali per l'applicazione e il funzionamento del prodotto, nonché le misure di sicurezza che possono essere adottate per garantire un funzionamento regolare. Agilent Technologies non fornisce alcuna garanzia né si assume alcuna responsabilità per applicazioni diverse da quelle descritte nel presente manuale o in cui i requisiti essenziali e le misure di sicurezza non siano rispettati. Il prodotto deve essere utilizzato solo da personale qualificato in grado di adottare le misure di sicurezza necessarie in condizioni che non causano danni o lesioni.

Gli accessori e le attrezzi utilizzati con il prodotto devono essere forniti o approvati da Agilent Technologies.

Qualsiasi operazione di regolazione o manutenzione deve essere eseguita da un tecnico professionista informato dei rischi.

Le riparazioni sul prodotto devono essere eseguite esclusivamente da personale autorizzato Agilent.

Istruzioni per l'uso

Uso improprio

Agilent Technologies declina ogni responsabilità derivante dall'uso improprio del TwisTorr 305 FS Remote Controller.

L'uso improprio comporterà la perdita di tutti i reclami per responsabilità e garanzie. L'uso improprio è definito come:

- installazione del dispositivo con materiale di montaggio non specificato
- funzionamento in ambiente condensante
- funzionamento in ambienti ad alta umidità fuori dal raggio specificato
- funzionamento in ambienti polverosi
- funzionamento con tensioni non specificate
- funzionamento del dispositivo in aree con radiazioni ionizzanti
- funzionamento in aree potenzialmente esplosive
- utilizzo del dispositivo in sistemi in cui stress e vibrazioni simili a impatti o forze periodiche influiscono sul dispositivo.

Istruzioni per l'uso

Attrezzatura di protezione

Non essendo prevista alcuna manutenzione per questo dispositivo, non sono necessari altri dispositivi di protezione.

AVVERTENZA Rischio di lesioni dovute alla caduta di oggetti



Durante il trasporto manuale dei controller, sussiste il pericolo che i carichi scivolino e cadano.

- Trasportare i controller con due mani.

Linee guida di sicurezza per i Controller di pompe turbomolecolari

I controller della pompa turbomolecolare come descritto nel seguente manuale non devono essere aperti dall'utente per evitare il rischio di danneggiare i componenti interni.

AVVERTENZA Per evitare danni alle apparecchiature e per prevenire lesioni al personale operativo, è necessario seguire scrupolosamente le istruzioni di installazione fornite nel presente manuale!



Trasporto & Immagazzinamento

Durante il trasporto e l'immagazzinamento dei controller devono essere soddisfatte le seguenti condizioni ambientali:

- temperatura: da -20 °C a +70 °C
- umidità relativa: 0 ÷ 95% (non condensante).

Descrizione del prodotto

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Agilent prima dell'utilizzo dell'apparecchiatura. L'Agilent si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche.

I controller della serie TwisTorr 305 FS Remote sono dei convertitori di frequenza, controllati da un microprocessore, realizzati con componenti a stato solido e con capacità di autodiagnosica e autoprotezione.

Caratteristiche del controller:

- Operatività frontale / remota / seriale
- Pilotaggio a 24 Vdc della ventola di raffreddamento pompa
- Pilotaggio vent valve
- Lettura velocità pompa in seguito al comando di arresto (lettura velocità di arresto)
- Lettura della pressione se è collegato il manometro FRG
- Impostazione automatica tensione di ingresso
- Interfaccia Profibus (opzionale)

Informazioni dettagliate sono fornite nella sezione "Technical Information".

Installazione

Preparazione per l'installazione

Il controller viene fornito in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere il controller e a non sottoporlo ad urti.

Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 94/62 e successive modifiche.

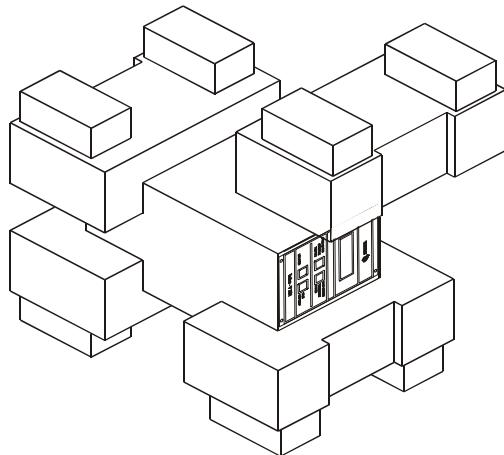


Figura 1 Imballo dei controller TwisTorr 305 FS Remote

Set-up

AVVERTENZA



Il controller è progettato solo per uso interno e deve essere alimentato mediante un cavo di alimentazione a tre fili (vedere tabella delle parti ordinabili) con una spina di tipo approvato a livello internazionale ai fini della sicurezza dell'utente. Utilizzare sempre questo cavo di alimentazione ed inserire la spina in una presa con un adeguato collegamento di terra onde evitare scariche elettriche e per rispettare le specifiche CE. All'interno del controller si sviluppano alte tensioni che possono recare gravi danni o la morte. Prima di eseguire qualsiasi operazione di installazione o manutenzione del controller scollegarlo dalla presa di alimentazione.

AVVERTENZA



Cavo di alimentazione: il cavo corretto per il cablaggio elettrico è un cavo a tre fili (Ph+N+Terra).

La sezione del cavo deve essere almeno 1,0 mm² in caso di alimentazione 240 Vac o 2 mm² in caso di alimentazione 120 Vac per una lunghezza del cavo di riferimento pari a 3 m.

NOTA

Il controller TwisTorr 305 FS Remote può essere installato su di un tavolo o all'interno di un apposito rack. In ogni caso occorre che l'aria di raffreddamento possa circolare liberamente intorno all'apparato. Non installare né utilizzare il controller in ambienti esposti ad agenti atmosferici (pioggia, gelo, neve), polveri, gas aggressivi, in ambienti esplosivi o con elevato rischio di incendio.

Durante il funzionamento è necessario che siano rispettate le seguenti condizioni ambientali:

- temperatura: da +5 °C to +45 °C
- umidità relativa: 0 – 95 % (non condensante).

Per gli altri collegamenti e l'installazione degli accessori opzionali, vedere la sezione "Technical Information".

Fissaggio del TwisTorr 305 FS Remote Controller

In questo paragrafo sono riportate le principali procedure operative. Per ulteriori dettagli e per procedure che coinvolgono collegamenti o particolari opzionali, fare riferimento al paragrafo "Use" dell'appendice "Technical Information".

Prima di utilizzare il controller, effettuare tutti i collegamenti elettrici e pneumatici e fare riferimento al manuale di istruzioni della pompa TwisTorr 305 FS.

AVVERTENZA



Per evitare danni alle persone ed all'apparato, nel caso in cui la pompa sia appoggiata su di un tavolo assicurarsi che sia stabile. Non fare funzionare mai la pompa se la flangia di ingresso non è collegata al sistema o non è chiusa con la flangia di chiusura.

NOTA

Una volta collegato alla tensione di linea, per azionare il controller in modo semplice, collegare sul connettore J1 il connettore di accoppiamento pre-cablato che viene fornito insieme al controller.

Il connettore di accoppiamento pre-cablato è un modo semplice e veloce per consentire il comando del controller (ad esempio, agendo sul pannello frontale), senza dover implementare altre connessioni esterne cablate come Serial Com o Remote I/O.

La pompa forepump e la pompa Twistorr 305 FS possono essere attivate contemporaneamente.

Comandi, Indicatori e Connettori

Di seguito sono illustrati il pannello di comando del Controller ed i pannelli di interconnessione.

Per maggiori dettagli fare riferimento alla sezione "Technical Information".

Descrizione pannello frontale

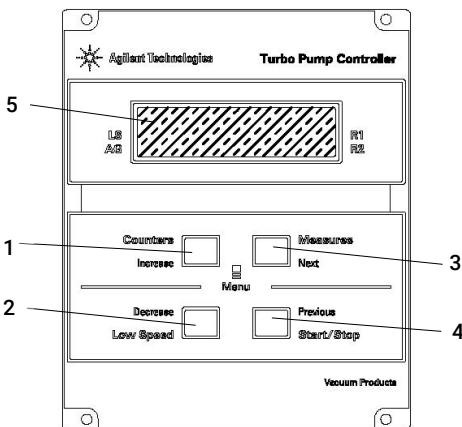


Figura 2 Pannello frontale del Controller TwisTorr 305 FS Remote

-
- 1 Pulsante per richiamare sul display i parametri cycle number, cycle time e pump life.
 - 2 Pulsante per la selezione del modo LOW SPEED. È attivo solo quando è selezionato il modo di comando dal pannello frontale. Premendolo una volta, la pompa ruota a velocità "stand-by". Premendolo ancora si disattiva il modo LOW SPEED.
 - 3 Pulsante per richiamare sul display i parametri pump current, pump temperature, pump power e rotational speed. È sempre attivo indipendentemente dal modo di funzionamento scelto. Premendo assieme i pulsanti 3 e 1 per almeno 2 secondi viene attivato un programma con il quale è possibile programmare alcuni parametri operativi.
 - 4 Pulsante per inviare i comandi di START, STOP/RESET. È attivo solo quando è selezionato il modo di comando dal pannello frontale. Premendolo una volta si attiva la fase di avvio; premendolo nuovamente si arresta la pompa. Se la pompa si è fermata automaticamente a causa di un guasto, occorre premere questo pulsante una prima volta per eseguire il reset del controller ed una seconda volta per riavviare la pompa.
 - 5 Display alfanumerico a cristalli liquidi: matrice di punti, 2 linee x 16 caratteri.
-

Istruzioni per l'uso

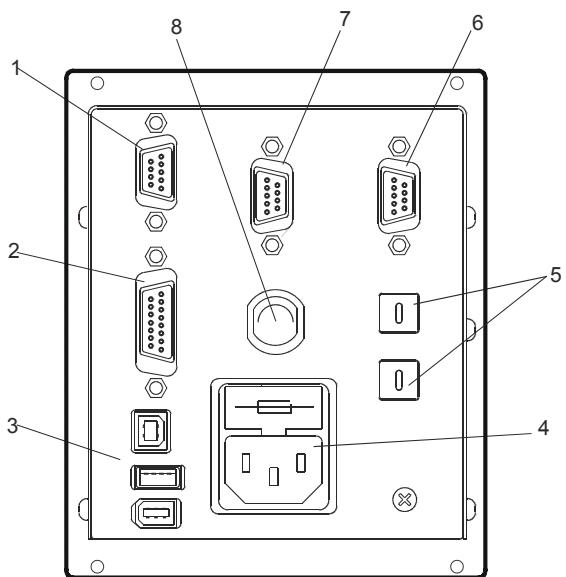


Figura 3 Pannello posteriore dei Controller TwisTorr 305 FS Remote

-
- 1 Connettore di ingresso dei segnali logici (il connettore di accoppiamento viene fornito con l'apposito ponticello di richiusura).
 - 2 Connettore segnali logici in uscita e monitoraggio frequenza pompa più uscita analogica programmabile.
 - 3 Connettore di uscita alimentazione (24 Vdc per la ventola di raffreddamento pompa, vent valve e calibro).
 - 4 Modulo di ingresso alimentazione controller che comprende i fusibili, la presa di alimentazione ed il filtro ENC.
 - 5 Switch a rotazione per impostare l'indirizzo del Profibus.
 - 6 Profibus (opzionale).
 - 7 Connettore seriale per controllo da remoto.
 - 8 Pompa.
-

Avvio e funzionamento del Controller TwisTorr 305 FS Remote

Accensione del Controller

Per accendere il controller è sufficiente inserire il cavo di alimentazione nella presa di rete.

Avvio della Pompa

Per avviare la pompa occorre abilitare l'ingresso di interlock e premere il pulsante START del pannello frontale.

Arresto della Pompa

Per arrestare la pompa occorre premere il pulsante STOP del pannello frontale.

Soft Start

AVVERTENZA



Per garantire la corretta lubrificazione dei cuscinetti della pompa turbo, al primo avvio dopo l'installazione, il controller imposta in modo automatico (e non disattivabile dall'utente) una rampa di avvio graduale della pompa detta "Soft Start" (la pompa viene portata in rotazione per passi successivi di velocità).

Una volta che il Soft Start è stato completato con successo, gli avvii successivi avverranno secondo la modalità normale quindi con una rampa di salita continua (e non più a passi).

In caso di utilizzo di una pompa nuova con un'unità di controllo usata, ricordarsi di impostare manualmente la modalità soft start.

La modalità di avvio graduale richiederà più tempo rispetto all'avvio standard; l'utente deve attendere che la pompa sia completamente a regime prima di arrestarla.

Dopo il primo avvio, la centralina non riavvia la pompa in modalità Soft Start.

L'utente può eventualmente decidere di avviare la pompa utilizzando la rampa di Soft Start a necessità, agendo sull'apposito comando seriale (o sull'apposito input remoto), come dettagliato nel capitolo "Technical Information" (rif. rispettivamente ai paragrafi Window Meanings - per seriale - e al paragrafo Controller Connection, P1 – Input - per l'input remoto).

NOTA

Quando è attiva la modalità Soft Start (avviata automaticamente dal controller al primo avvio oppure attivata manualmente dall'utente), il controller mostra una relativa indicazione sul display:

- messaggio "SOFT START MODE".
- indicatore a barre che varia in relazione all'evoluzione della velocità.

L'indicatore a barre viene visualizzato nello spigolo alto a destra del display (rif. freccia A) in aggiunta e contemporaneamente agli altri messaggi già presenti sul medesimo. Il messaggio "SOFT START MODE" viene invece visualizzato sul display in modo alternato rispetto gli altri messaggi (rif. freccia B) e rimane stabilmente visualizzato per circa 3 secondi. Quando il display del controller non visualizza più né l'indicatore a barre e né il messaggio STARTING in modo alternato al messaggio SOFT START MODE, ma visualizza il solo messaggio NORMAL, allora l'avvio in SOFT START è stato completato con successo.

Durante l'avvio in soft start automatico (primo avvio), se questo dovesse essere interrotto prima di essere stato completato (ad esempio il controller si spegne per mancanza rete o viene inviato un messaggio di STOP al controller), al successivo riavvio il controller riattiverà la rampa di Soft Start in modo automatico.

Istruzioni per l'uso

Durante il Soft Start (sia esso automatico o imposto da utente), e finché esso non è completato, lo stato indicato dalla specifica finestra seriale (fare riferimento al capitolo "Technical Information", paragrafo Window Meanings) è "2" che indica "Rampa". Al completamento del Soft Start, se eseguito con successo, lo stato indicato dalla specifica finestra seriale è "5" che indica "NORMAL".

Indicazioni display ad inizio Soft Start: il display indica STARTING e visualizza l'indicatore a barre; in modo alternato viene anche visualizzato il messaggio "SOFT START MODE".



Indicazioni display con Soft Start in progress: indicatore a barre evolve all'aumentare dei passi di velocità.



Istruzioni per l'uso

Indicazioni display con Soft Start completato: il messaggio SOFT START MODE non appare più sul display, l'indicatore a barre nemmeno, il messaggio STARTING è sostituito dal messaggio NORMAL.



NOTA

Dopo un lungo periodo di inattività (60 giorni o più), al fine di consentire nuovamente la corretta ridistribuzione del grasso presente nei cuscinetti, è necessario riavviare la pompa tramite la modalità Soft Start.

Informazioni dettagliate sono fornite nella sezione "Technical Information".

Messaggi di errore

In alcuni casi di guasto la circuiteria di autodiagnosi del controller presenta alcuni messaggi di errore elencati nella tabella seguente.

Tab. 1 Messaggi di errore

Messaggio	Descrizione	Azione correttiva
RUN UP TIME	La pompa non è riuscita a raggiungere una velocità > 700 Hz, entro il tempo previsto (Tempo di avvio, che è configurabile).	Verificare l'impostazione del tempo di avvio: deve essere impostato in base al processo del cliente. Controllare il carico di gas che scorre all'interno della pompa e regolarlo di conseguenza. Verificare che il rotore della pompa possa ruotare liberamente. Riavviare la pompa.
CHECK CONNECTION TO PUMP	Malfunzionamento nel collegamento tra pompa e controller. Oppure La pompa ha una temperatura inferiore a 0 °C.	Verificare che il cavo di collegamento tra pompa e controller sia ben fissato da entrambe le estremità e non sia interrotto. Premere due volte il pulsante START per riavviare la pompa.
WAITING INTERLOCK	È attivo il segnale di interlock presente sul connettore P1 a causa dell'interruzione del corto circuito tra il pin 3 ed il pin 8 del connettore J1, o a causa dell'apertura del segnale di interlock esterno.	Ripristinare il corto circuito tra il pin 3 ed il pin 8 del connettore P1, o chiudere il segnale di interlock esterno.
PUMP OVERTEMP.	La temperatura del corpo pompa ha superato il limite superiore di temperatura consentito, che è in funzione del tipo di gas selezionato (Ar: 50°C; N2: 55°C; He: 60°C).	Attendere che la temperatura ritorni al di sotto della soglia. Premere due volte il pulsante START per riavviare la pompa.
CONTROLLER OVERTEMP.	La temperatura dell'ambiente del controller ha superato i 70 °C. Oppure. La temperatura del radiatore del controller è superiore a 60 °C.	Attendere che la temperatura ritorni al di sotto della soglia. Premere due volte il pulsante START per riavviare la pompa.
TOO HIGH LOAD	La corrente assorbita dalla pompa è maggiore di quella programmata.	Verificare che il rotore della pompa abbia la possibilità di ruotare liberamente. Premere due volte il pulsante START per riavviare la pompa.

Istruzioni per l'uso

Tab. 1 Messaggi di errore

SHORT CIRCUIT	Durante il funzionamento normale (dopo la fase di avvio) la connessione di uscita è in corto circuito.	Verificare i collegamenti tra pompa e controller. Premere due volte il pulsante START per riavviare la pompa.
SYSTEM OVERRIDE	La pompa è stata fermata da un segnale di emergenza proveniente da un contatto remoto.	Staccare il cavo di alimentazione del controller e correggere la causa dell'emergenza. Ricollegare il cavo di alimentazione e premere due volte il pulsante START per riavviare la pompa.
OVERVOLTAGE	Si è verificato un guasto nella sezione di alimentazione del controller, o il controller ha ricevuto un segnale spurio.	Premere due volte il pulsante START per riavviare la pompa. Se il messaggio si ripresenta rivolgersi in Agilent per la manutenzione.
RUN UP TIME	Tempo di Run Up scaduto.	Verificare la corretta impostazione del tempo di Run Up in funzione dell'applicazione Verificare il carico di gas applicato alla pompa.

Manutenzione

I controller della serie TwisTorr 305 FS Remote non richiedono alcuna manutenzione. Qualsiasi intervento deve essere eseguito da personale autorizzato.

In caso di guasto è possibile usufruire del servizio di riparazione Agilent o del "Agilent advanced exchange service", che permette di ottenere un controller rigenerato in sostituzione di quello guasto.

AVVERTENZA

Prima di effettuare qualsiasi intervento sul controller scollegare il cavo di alimentazione.



Qualora un controller dovesse essere rottamato, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

Smaltimento

Significato del logo "WEEE" presente sulle etichette.

Il simbolo qui sotto riportato è applicato in ottemperanza alla direttiva CE denominata "WEEE".

Questo simbolo (valido solo per i paesi della Comunità Europea) indica che il prodotto sul quale è applicato, NON deve essere smaltito insieme ai comuni rifiuti domestici o industriali, ma deve essere avviato ad un sistema di raccolta differenziata. Si invita pertanto l'utente finale a contattare il fornitore del dispositivo, sia esso la casa madre o un rivenditore, per avviare il processo di raccolta e smaltimento, dopo opportuna verifica dei termini e condizioni contrattuali di vendita.



Figura 4 Logo "WEEE"

Per maggiori informazioni consultare:

<http://www.agilent.com/environment/product/index.shtml>

Servizio Post Vendita

Nel caso in cui un cliente necessiti di un servizio di sostituzione o riparazione avanzato, si prega di contattare il distributore locale o spedire direttamente a:

vpt-customercare@agilent.com

vpl-customercare@agilent.com

È necessario completare il modulo “Request for Return” per restituire la pompa ad Agilent per l’assistenza (fornito alla fine di questo manuale).

2

Betriebsanleitung

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Informationen über diese Betriebsanleitung

Gültigkeit

Diese Betriebsanleitung enthält die Anweisungen für die Benutzer der TwisTorr 305 FS Remote Controller mit besonderer Bezugnahme auf die Begriffe für Sicherheit, Betrieb und Wartung auf der ersten Ebene, auf die Wartungsarbeiten beschränkt, für die der Benutzer verantwortlich ist.

Die in den spezifischen Abschnitten dargestellten Wartungsarbeiten mit spezifischen Verordnungen hinsichtlich der höheren Wartungsebene (entsprechend geschultes Personal für die Wartungsarbeiten) dürfen nicht durch den Benutzer ausgeführt werden.

Für eine korrekte Installation und Start/Stopp der Absatz „Installation“ konsultieren. Für eine detailliertere technische Verwendung das Kapitel „Technical Information“ konsultieren.

HINWEIS

- 1** Diese Betriebsanleitung enthält nützliche Informationen, damit das gesamte Personal, das die TwisTorr 305 FS Remote Controller verwendet, diese in Sicherheit verwenden und die perfekte Funktionstüchtigkeit für ihre gesamte Betriebsdauer garantieren kann.
- 2** Diese Betriebsanleitung muss zusammen mit allen mit dieser zusammenhängenden Veröffentlichungen an einem zugänglichen Ort, der allen Bedienern/Wartungspersonal bekannt ist, aufbewahrt werden.

Definitionen und Terminologie

Definition von Vorsicht, Warnung und Hinweis

Einige wichtige Bezüge dieser Betriebsanleitung werden durch Kontrastfarben hervorgehoben und eingeklammert.

VORSICHT

Die Vorsichtshinweise werden vor Verfahren angezeigt, die Schäden am Gerät verursachen könnten, wenn sie nicht beachtet werden.

WARNUNG



Die Warnhinweise lenken die Aufmerksamkeit des Bedieners auf ein Verfahren oder einen spezifischen Vorgang, der schwere Verletzungen von Personen zur Folge haben könnte, wenn er nicht korrekt ausgeführt wird.

HINWEIS

Die Hinweise enthalten wichtige Informationen und liefern weitere Details über spezifische Arbeitsschritte.

Warnsymbole

Das Folgende ist eine Liste von Symbolen, die in Verbindung mit den Warnungen auf dem TwisTorr 305 FS Remote Controller angezeigt werden. Die von ihnen beschriebene Gefahr wird ebenfalls angezeigt.

Ein dreieckiges Symbol weist auf eine Warnung hin. Die Bedeutung der Symbole, die neben Warnhinweisen in der Dokumentation oder auf dem Gerät selbst erscheinen können, ist wie folgt:



Allgemeine Gefahr



Allgemeine Gefahr



Europäische
Konformitätserklärung



Herstellungsbetrieb



CSA certification



Elektro- und
Elektronikaltgeräte



RoHS-
Chinazertifizierung



UK CA-Kennzeichnung

Betriebsanleitung

Das folgende Symbol kann auf am Gerät angebrachten Warnschildern verwendet werden. Wenn Sie dieses Symbol sehen, finden Sie in der jeweiligen Betriebs- oder Wartungsanleitung das richtige Verfahren, auf das sich dieses Warnschild bezieht.



Die folgenden Symbole werden zu Ihrer Information auf dem Instrument angezeigt.

!	Allgemeine Gefahr
!	Allgemeine Gefahr
CE	CE-Zertifizierung
CSA	CSA-Zertifizierung
	RoHS-Chinazertifizierung
	Elektro- und Elektronikaltgeräte
UK CA	UK CA-Kennzeichnung

Sicherheit

Dieser Abschnitt enthält die in der Maschinenrichtlinie 2015/14/30 EG vorgeschriebenen Informationen, die für die Einhaltung der Sicherheitsbestimmungen im Allgemeinen und in Bezug auf den spezifischen Einsatz der Maschine von wesentlicher Bedeutung sind.

Die Nichtbeachtung dieser Anweisungen und der anderen in diesem Handbuch enthaltenen Anweisungen kann die in der Konstruktionsphase vorgesehenen Sicherheitsbedingungen ineffizient machen und Unfälle bei den Bedienern der Maschine verursachen.

Agilent Technologies lehnt jede Verantwortung für Schäden an der Maschine oder für die physische Sicherheit des Bedieners oder Dritter ab, die sich aus der Nichtbeachtung der in den technischen Unterlagen angegebenen Sicherheitsregeln ergeben.

Sachgemäße Verwendung

Dieses Handbuch enthält wichtige Warnungen und Sicherheitshinweise, die beachtet werden müssen, damit das Gerät sicher funktioniert.

Das in dieser Anleitung beschriebene Produkt ist ausschließlich für den in der Anleitung angegebenen Anwendungsbereich bestimmt. Das Handbuch enthält auch Angaben zu den grundlegenden Anforderungen für die Anwendung und den Betrieb des Produkts sowie zu den Sicherheitsmaßnahmen, die zur Gewährleistung eines regelmäßigen Betriebs ergriffen werden können. Agilent Technologies übernimmt keine Garantie oder Verantwortung für Anwendungen, die nicht in diesem Handbuch beschrieben sind oder bei denen die grundlegenden Anforderungen und Sicherheitsmaßnahmen nicht eingehalten werden.

Das Produkt darf nur von qualifiziertem Personal verwendet werden, das in der Lage ist, die erforderlichen Sicherheitsmaßnahmen unter Bedingungen zu treffen, die keine Schäden oder Verletzungen verursachen. Alle mit dem Produkt verwendeten Zubehörteile und Geräte müssen von Agilent Technologies geliefert oder genehmigt werden.

Einstellungs- oder Wartungsarbeiten müssen von einem Fachmann durchgeführt werden, der über die Risiken informiert ist.

Reparaturen am Produkt dürfen ausschließlich von Agilent-autorisiertem Personal durchgeführt werden.

Unsachgemäße Anwendung

Agilent Technologies lehnt jede Verantwortung ab, die sich aus der unsachgemäßen Benutzung vom TwisTorr 305 FS Remote Controller ergibt.

Bei unsachgemäßer Verwendung verfallen alle Haftungs- und Gewährleistungsansprüche. Unsachgemäße Verwendung ist definiert als:

- Montage des Geräts unter Verwendung von nicht vorgesehenem Befestigungsmaterial
- Betrieb in Kondenswasserumgebung.
- Betrieb in einer Umgebung mit hoher Luftfeuchtigkeit über dem angegebenen Wertebereich hinaus
- Betrieb in staubiger Umgebung
- Betrieb mit anderen als den festgelegten Netzspannungen
- Betrieb des Geräts in Bereichen mit ionisierender Strahlung
- Betrieb in explosionsgefährdeten Bereichen
- Einsatz des Geräts in Anlagen, in denen stoßartige Einwirkungen und Vibrationen oder regelmäßig auftretende Kräfte auf das Gerät einwirken.

Schutzausrüstung

Da für dieses Gerät keine Wartung vorgesehen ist, ist keine weitere Schutzeinrichtung erforderlich.

WARNING

Verletzungsgefahr durch herunterfallende Gegenstände



Beim Tragen von Vakuum-Controllern von Hand besteht die Gefahr, dass Lasten verrutschen und herunterfallen.

- Controller mit zwei Händen transportieren.

Sicherheitsrichtlinien für Turbomolekularpumpen-Steuergeräte

Zur Vermeidung des Risikos einer Beschädigung interner Komponenten dürfen die in dieser Bedienungsanleitung beschriebenen Turbomolekularpumpen-Steuergeräte nicht vom Benutzer geöffnet werden.

WARNING

Um Geräteschäden und Verletzungen des Bedienpersonals zu vermeiden, sind die in diesem Handbuch enthaltenen Installationsanweisungen unbedingt zu beachten!



Transport und Lagerung

Beim Betrieb müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: von +5 °C bis +45 °C
- Relative Luftfeuchtigkeit: 0 ÷ 95% (nicht kondensierend).

Produktbeschreibung

Dieser Apparat ist für Fachbetriebe bestimmt. Vor Gebrauch sollte der Benutzer dieses Handbuch sowie alle weiteren mitgelieferten Zusatzdokumentationen genau lesen. Bei Nichtbeachtung - auch teilweise - der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Mißachtung der einheimischen, hier zur Geltung kommenden Bestimmungen übernimmt die Firma Agilent keinerlei Haftung.

Die Controller der Serie TwisTorr 305 FS Remote sind mikroprozessorgesteuerte Frequenzwandler. Sie sind mit Festkörperbauteilen gefertigt und verfügen über ein Selbstdiagnose- und ein Selbstschutzsystem.

Controllereigenschaften:

- Konsol-, Fern- und serielle Operationen
- 24V= Kühlventilator-Treiber
- Vent Valve Treiber
- Auslesen der Pumpgeschwindigkeit nach Stoppbefehl
(Lesen der Stoppgeschwindigkeit)
- Druckanzeige bei angeschlossenem FRG-Druckmessgerät
- Profibus-Schnittstelle (Option)
- automatische Einstellung der Eingangsspannung

Detaillierte Informationen entnehmen Sie dem Abschnitt "Technical Information".

Installation

Vorbereitung zum Einbau

Der Controller wird mit einer speziellen Schutzverpackung geliefert. Eventuelle Transportschäden müssen der zuständigen örtlichen Verkaufsstelle gemeldet werden.

Beim Auspacken vorsichtig vorgehen, damit der Controller nicht fällt oder Stößen ausgesetzt wird.

Das Verpackungsmaterial muß korrekt entsorgt werden. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 94/62 für Umweltschutz

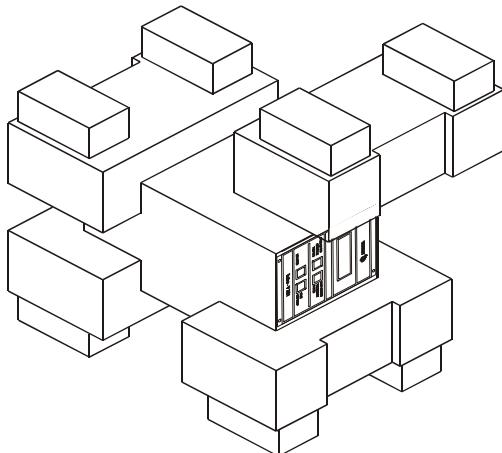


Abbildung 5 Verpackung der Controller

Set-up

WARNUNG



Zum Schutz des Bedieners darf der Controller nur im Gebäude zum Einsatz kommen und nicht außerhalb. Er muss mit einem dreiadrigem Netzkabel (siehe Tabelle bestellbares Zubehör) und dem (international zugelassenen) Stecker angeschlossen werden. Es sollte immer dieses Netzkabel benutzt werden, das an eine korrekt geerdete Steckdose anzuschließen ist, um den CE Richtlinien zu entsprechen und Stromschläge zu vermeiden. Im Inneren des Controllers entstehen hohe Spannungen, die schwere Schäden verursachen und zum Teil lebensgefährlich sein können. Vor jedem Montage- bzw. Wartungseingriff muß deshalb der Netzstecker gezogen werden.

WARNUNG



Netzkabel: Das geeignete Kabel für die Stromleitung ist ein dreiadriges (Ph+N+Erde) Kabel.

Der Kabelquerschnitt muss mindestens 1,0 mm² bei einer Netzspannung von 240 Vac oder 2 mm² bei einer Netzspannung von 120 Vac bei einer Referenzkabellänge von 3 m betragen.

HINWEIS

Der Controller kann auf einen Tisch oder ein Gestell montiert werden. In beiden Fällen muß auf die ungehinderte Zirkulation der Kühlluft im Bereich des Geräts geachtet werden. Der Controller darf nicht in Umgebungen installiert u/o benutzt werden, die Witterungseinflüssen (Regen, Frost, Schnee), Staub und aggressiven Gasen ausgesetzt sind und in denen Explosions- und erhöhte Brandgefahr besteht.

Beim Betrieb müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: von +5 °C bis +45 °C
- Relative Luftfeuchtigkeit: 0 – 95 % (nicht kondensierend).

Weitere Anschlüsse und Installation von optionalem Zubehör finden Sie im Abschnitt "Technical Information".

Montage von TwisTorr 305 FS Remote Controller

In diesem Kapitel sind die wichtigsten Betriebsvorgänge aufgeführt.
Zur Installation von optionalem Zubehör siehe "Technical Information".

Stellen Sie vor der Verwendung des Controllers alle erforderlichen Strom- und Pneumatikanschlüsse her und lesen Sie die Bedienungsanleitung für die Pumpe TwisTorr 305 FS.

WARNUNG



Steht die Pumpe auf einem Tisch, muß auf den stabilen Stand geachtet werden, da sonst die Gefahr von Personen- und Geräteschäden besteht. Die Pumpe nie einschalten, wenn der Eingangsflansch nicht am System angeschlossen bzw. nicht mit dem Schließflansch abgedeckt ist.

HINWEIS

Nach Anschluss an die Netzspannung können Sie den Regler leicht bedienen, indem Sie den mit dem Regler mitgelieferten vorverdrahteten Gegenstecker an den J1-Stecker anschließen.

Der vorverdrahtete Gegenstecker ist eine einfache und schnelle Möglichkeit, den Regler zu bedienen (z. B. durch Betätigung der Fronttafel), ohne dass dazu andere verdrahtete externe Verbindungen wie Serial Com oder Remote I/O benötigt werden. Die Vorpumpe und die TwisTorr 305 FS Pumpe können gleichzeitig eingeschaltet werden.

Steuerungen, Anzeigen und Verbinder des Controllers

Der folgende Abschnitt beschreibt die vordere und hintere Konsole des Controllers. Für weitere Einzelheiten siehe „Technical Information“.

Fronttafel der Controller

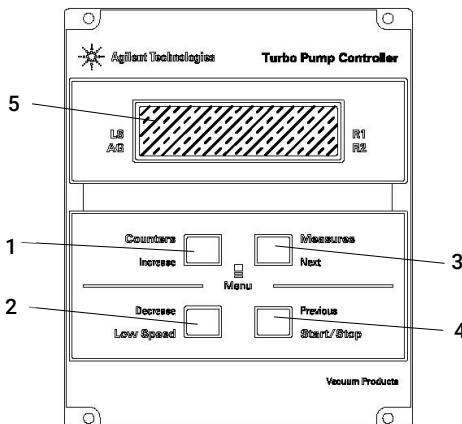


Abbildung 6 Fronttafel der Controller TwisTorr 305 FS Remote

-
- 1 Taste für die Anzeige der Parameter "cycle number", "cycle time" und "pump life".
 - 2 Taste für die Einstellung des Modus LOW SPEED. Sie ist nur aktiv, wenn der Steuermodus auf Fronttafel eingestellt ist. Bei einmaligem Drücken läuft die Pumpe in Bereitschafts-Geschwindigkeit. Bei nochmaligem Drücken wird der Modus LOW SPEED deaktiviert.
 - 3 Taste für die Anzeige der Parameter "pump current", "pump temperature", "pump power" und "rational speed". Sie ist immer aktiv, unabhängig vom gewählten Betriebsmodus. Bei gemeinsamer, mindestens 2 Sekunden langer Betätigung der Tasten 3 und 1 wird ein Programm aktiviert, mit dem einige Betriebsparameter programmiert werden können.
 - 4 START-, STOP/RESET-Taste. Sie ist nur aktiv, wenn der Steuermodus auf der Fronttafel eingestellt ist. Bei einmaligem Drücken wird die Startphase aktiviert. Bei nochmaligem Drücken stoppt die Pumpe. Bei automatischem Pumpenstop durch Störung muß diese Taste ein erstes Mal zur Controller-Rücksetzung und dann ein zweites Mal zum Neustarten der Pumpe gedrückt werden.
 - 5 Alphanumerisches Flüssigkristall-Display: Punkt-matrix, 2 Zeilen mit 16 Stellen.
-

Betriebsanleitung

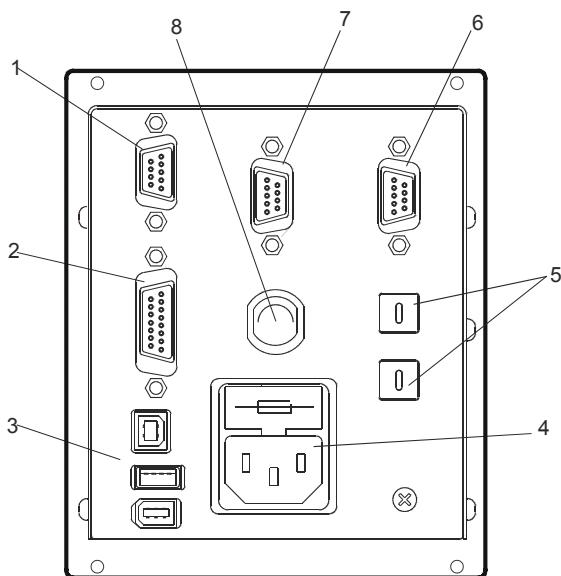


Abbildung 7 Rücktafel der Controller TwisTorr 305 FS Remote

-
- 1 Eingangsverbinder der logischen Signale (der Kupplungsverbinder wird mit einer Wiederverschließbrücke geliefert).
 - 2 Stecker für logische Signale und Pumpenmonitor plus programmierbarer Analogausgang.
 - 3 Stromausgangsstecker (24 V= für Pumpenkühlventilator, Vent Valve und Messinstrument).
 - 4 Netzeingangsmodul des Controllers bestehend aus Netzsicherungen, Netzstecker und EMC Filter.
 - 5 Drehschalter zum Setzen der Profibus Adresse.
 - 6 Profibus (Option).
 - 7 Serieller Stecker zur Fernsteuerung.
 - 8 Pumpenstecker.
-

Inbetriebnahme und Betrieb des Controller TwisTorr 305 FS Remote

Einschalten des Controllers

Zum Einschalten des Controllers genügt es, das Netzkabel an die Steckdose anzuschließen.

Pumpenstart

Zum Starten der Pumpe den Verrieglungseingang bestätigen und die START Taste of der vorderen Konsole des Controllers drücken.

Pumpenstopp

Zum Stoppen der Pumpe muß die STOP-Taste an der Fronttafel gedrückt werden.

Sanftanlauf (Soft Start)

WANRUNG



Zur Gewährleistung einer ordnungsgemäßen Schmierung der Lager der Turbopumpe stellt das Steuergerät bei der ersten Inbetriebnahme nach der Montage automatisch eine stufenweise Pumpenhochlaufphase ein (und ist nicht durch den Benutzer abschaltbar), die als „Soft Start“ bezeichnet wird (die Pumpe wird in aufeinanderfolgenden Drehzahlstufen hochgefahren). Nach erfolgreichem Softstart erfolgen die folgenden Anläufe im normalen Betriebsmodus, d. h. mit einer stetigen Zunahme (und nicht mehr in Schritten). Bei Verwendung einer neuen Pumpe mit einer gebrauchten Steuereinheit denken Sie daran, den Softstartmodus manuell einzustellen. Der Softstart-Modus dauert im Vergleich zum Standardstart länger. Der Benutzer muss warten, bis die Pumpe vollständig die Geschwindigkeit erreicht hat, bevor er die Pumpe anhält.

Nach dem ersten Start wird die Pumpe von der Steuereinheit nicht mehr im Softstartmodus gestartet.

Der Anwender kann entscheiden, ob er die Pumpe lieber mit dem Softstart-Anlauf mit dem seriellen Befehl oder mit Datenferneingabe in Gang setzen möchte (siehe dazu die Angaben aus Kapitel “Technical Information” Abschnitt “Window Meanings” für die serielle Schnittstelle bzw. “Controller Connection”, Abschnitt P1 – Input - für die Datenferneingabe).

HINWEIS

Bei aktiver Betriebsart Soft Start (sowohl wenn diese vom Steuergerät beim ersten Einschalten automatisch gestartet wurde als auch wenn sie vom Benutzer manuell aktiviert wurde) zeigt das Steuergerät auf dem Display Folgendes an:

- the "SOFT START MODE" message.
- a bar indicator that evolves in correspondence with the evolution of the speed steps.

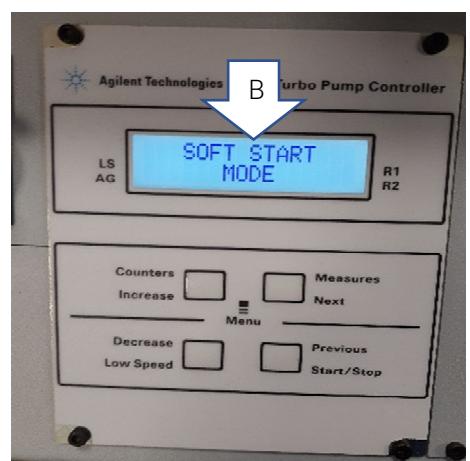
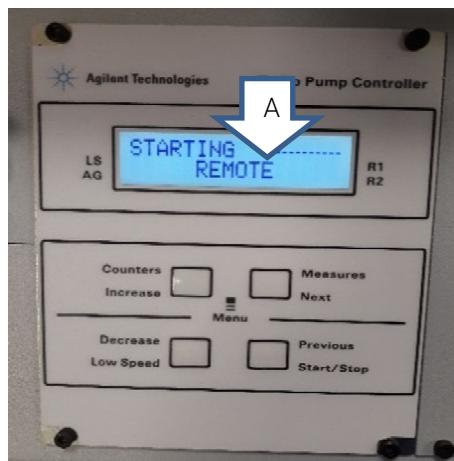
Die Balkenanzeige erscheint in der Ecke oben rechts auf dem Display (siehe Pfeil A) zusätzlich zu und gleichzeitig mit den anderen Meldungen, die bereits darauf erscheinen. Auf dem Display erscheint abwechselnd mit den anderen Meldungen (siehe Pfeil B) die Meldung „SOFT START MODE“, die etwa 3 Sekunden lang dauerhaft angezeigt wird. Erscheint auf dem Display des Steuergerätes nicht mehr die Balkenanzeige oder die Meldung STARTING im Wechsel mit der Meldung SOFT START MODE, sondern nur noch die Meldung NORMAL, dann wurde der SOFT START erfolgreich abgeschlossen.

Sollte die Inbetriebnahme beim automatischen Softstart (Erster Anlauf) unterbrochen werden, bevor sie abgeschlossen ist (wenn das Steuergerät beispielsweise aufgrund eines Stromausfalls abgeschaltet oder eine STOP-Meldung an das Steuergerät gesendet wird), wird die Anlaufphase „Soft Start“ beim nächsten Neustart des Steuergeräts automatisch wieder aktiviert.

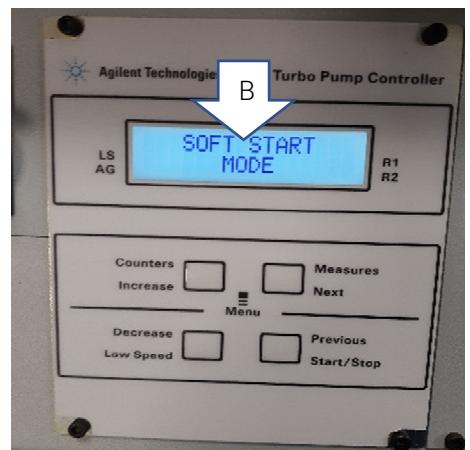
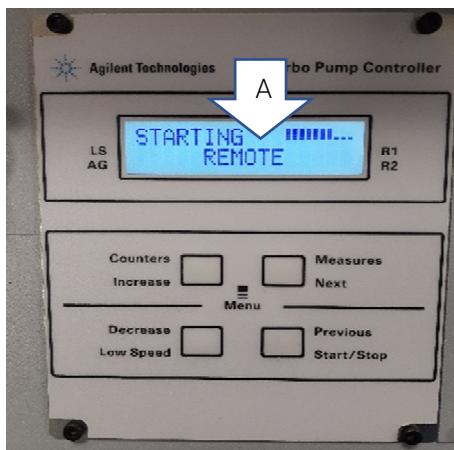
Betriebsanleitung

Während des Softstarts (egal ob automatisch oder vom Benutzer eingestellt) lautet der vom entsprechenden seriellen Fenster (siehe dazu die Angaben aus Kapitel "Technical Information" Abschnitt "Window Meanings") angezeigte Status bis zum Ende "2", was für "Ramp" (Anlauf) steht. Nach erfolgreichem Abschluss des Softstarts lautet der im entsprechenden seriellen Fenster angezeigte Status "5", was für "NORMAL" steht.

Displayanzeigen zu Softstart-Beginn: Auf dem Display erscheint STARTING sowie die Balkenanzeige; zusätzlich erscheint im Wechsel die Meldung "SOFT START MODE".



Displayanzeigen bei laufendem Soft Start: Die Balkenanzeige verändert sich mit zunehmenden Drehzahlstufen weiter.



Betriebsanleitung

Display-Anzeigen bei abgeschlossenem Soft Start: Die Meldung SOFT START MODE erscheint nicht mehr auf dem Display, auch die Balkenanzeige erscheint nicht mehr, die Meldung STARTING wird durch die Meldung NORMAL ersetzt.



HINWEIS

Nach längerer Inaktivität (60 Tage oder länger) muss die Pumpe über den Softstart-Modus erneut gestartet werden, damit das in den Lagern vorhandene Fett wieder richtig verteilt wird

Detaillierte Informationen finden Sie im Abschnitt "Technical Information".

Fehlermeldungen

In einigen Störungsfällen zeigt das Selbstdiagnosesystem des Controllers die in der nachstehenden Tabelle zusammengefaßten Meldungen an.

Tab. 2 Fehlermeldungen

Meldung	Beschreibung	Behebung
RUN UP TIME	Die Pumpe konnte innerhalb des erwarteten Wertes (konfigurierbare Anlaufzeit) keinen Drehzahlwert > 700 Hz erreichen.	Prüfen Sie, ob die Anlaufzeit eingestellt ist: Sie sollte entsprechend dem Kundenprozess eingestellt sein. Überprüfen Sie die in der Pumpe strömende Gaslast und stellen Sie sie entsprechend ein. Überprüfen Sie, ob sich der Pumpenrotor frei drehen kann. Starten Sie die Pumpe neu.
CHECK CONNECTION TO PUMP	Fehlfunktion der Pumpen-Controller Verbindung. Oder Die Temperatur der Pumpe ist unter 0 °C.	Sicherstellen, daß das Verbindungsleitungskabel zwischen Pumpe und Controller an beiden Seiten korrekt befestigt ist und keine Unterbrechung vorliegt. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten.
WAITING INTERLOCK	Das Interlock-Signal auf dem Verbinder P1 ist wegen der Kurzschluß-unterbrechung zwischen Pin 3 und Pin 8 des Verbinder K1 oder wegen der Öffnung des externen Interlock-Signals aktiv.	Den Kurzschluß zwischen Pin 3 und Pin 8 des Verbinder P1 rücksetzen oder das externe Interlock-Signal schließen.
PUMP OVERTEMP.	Die Temperatur des Pumpenkörpers hat die maximal zulässige Obergrenze überschritten, abhängig von der gewählten Gasart (Ar: 50°C; N2: 55°C; He: 60°C).	Warten bis die Temperatur unter den Schwellenwert gesunken ist. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten.
CONTROLLER OVERTEMP.	Die Temperatur des Controllers hat 70 °C überschritten. Oder Die Temperatur des Kontrollerkühlkörpers ist über 60 °C.	Warten bis die Temperatur unter den Schwellenwert gesunken ist. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten.
TOO HIGH LOAD	Die Pumpen ist stromaufnahme größer als die vorgesehene.	Sicherstellen, daß der Pumpenrotor ungehindert drehen kann. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten.

Betriebsanleitung

Tab. 2 Fehlermeldungen

SHORT CIRCUIT	Während des Normalbetriebs (nach der Startphase) erfolgt ein Kurzschluß der Ausgangsverbindung.	Die Verbindung zwischen Pumpe und Controller prüfen. Die Pumpe durch zweimalige Betätigung der START-Taste neustarten..
SYSTEM OVERRIDE	Die Pumpe wurde durch ein von einem entfernten Kontakt kommendes Notsignal gestoppt.	Das Netzkabel des Controllers ausstecken und die Störungsursache beheben. Das Netzkabel wieder anschließen und die Pumpe durch zweimalige Betätigung der START-Taste neustarten.
OVERVOLTAGE	Defekt im Versorgungsbereich des Controllers bzw. der Controller hat ein falsches Signal erhalten.	Die Pumpe durch zweimalige Betätigung der START-Taste neustarten. Erscheint die Meldung wieder sollte der Agilent-Wartungsdienst gerufen werden.
RUN UP TIME	Anlaufzeitüberschreitung.	Prüfen Sie die Einrichtung der Anlaufzeit. Sie muss entsprechend dem Kundenprozess angepasst werden. Prüfen Sie die Menge der Gaslast, die in der Pumpe fließt.

Wartung

Die Controller der Serie TwisTorr 305 FS Remote sind wartungsfrei. Eventuell erforderliche Eingriffe müssen von dazu befugtem Fachpersonal ausgeführt werden. Bei einem Defekt kann der Agilent-Reparaturdienst bzw. der "Agilent advanced exchange service" in Anspruch genommen werden, der für die Erneuerung defekter Controller sorgt.

WARNUNG

Vor jedem Eingriff am Controller muß der Netzstecker gezogen werden.



Wenn ein Controller ausrangiert werden soll, muss sie entsprechend den einschlägigen nationalen Normen des jeweiligen Landes entsorgt werden

Entsorgung

Bedeutung des „WEEE“ Logos auf den Schildern.

Das folgende Symbol ist in Übereinstimmung mit der EG-Richtlinie WEEE (Waste Electrical and Electronic Equipment) angebracht.

Dieses Symbol (nur in den EU-Ländern gültig) zeigt an, dass das betreffende Produkt NICHT zusammen mit Haushalts- oder Industriemüll entsorgt werden darf, sondern einem speziellen Sammelsystem zugeführt werden muss. Der Endabnehmer sollte daher den Lieferanten des Geräts - d. h. die Muttergesellschaft oder den Wiederverkäufer - kontaktieren, um den Entsorgungsprozess zu starten, nachdem er die Verkaufsbedingungen geprüft hat.



Abbildung 8 Logo „WEEE“

Für weitere Informationen siehe:

<http://www.agilent.com/environment/product/index.shtml>

Service

Sollte ein Kunde einen erweiterten Austausch- oder Reparaturservice benötigen, wenden Sie sich bitte an den örtlichen Händler oder direkt an die Email-Adresse

vpt-customercare@agilent.com

vpl-customercare@agilent.com

Das Ausfüllen des "Request for Return" formulars ist erforderlich, um die Pumpe zur Wartung an Agilent zurückzusenden (am Ende dieses Handbuchs angegeben).

3 Mode d'emploi

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À propos de ce manuel

Validité

Le présent manuel contient les instructions destinées aux utilisateurs du TwisTorr 305 FS Remote Controller, notamment celles relatives à la sécurité, au fonctionnement et à la maintenance de premier niveau, dans la limite des activités de maintenance incomptant à l'utilisateur.

Les opérations de maintenance décrites dans des paragraphes spécifiques qui contiennent des dispositions relevant d'un niveau de maintenance plus élevé (personnel spécialement formé aux opérations de maintenance) ne doivent pas être effectuées par l'utilisateur.

Pour une installation et une mise en marche/arrêt correctes, consultez le paragraphe « Installation ». Pour une utilisation technologique plus détaillée, consultez le chapitre « Technical Information ».

NOTE

- 1** Ce manuel contient des informations utiles pour que l'ensemble du personnel puisse utiliser le TwisTorr 305 FS Remote Controller en toute sécurité et pour garantir un fonctionnement parfait pendant toute sa durée de vie.
 - 2** Veuillez conserver ce manuel et tous les documents connexes dans un lieu accessible connu de tous les opérateurs et du personnel de maintenance.
-

Définitions et terminologie

Signification des messages d'attention, d'avertissement et des notes

Dans ce manuel, certaines informations importantes sont surlignées et encadrées avec des couleurs voyantes.

ATTENTION Les messages d'attention sont affichés au début de procédures qui, si elles ne sont pas respectées, peuvent entraîner des dommages aux équipements.

AVERTISSEMENT  Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une pratique particulière qui, si elle n'est pas effectuée correctement, peut entraîner de graves blessures.

NOTE Les remarques contiennent des informations importantes et fournissent des précisions sur certains passages particuliers.

Symboles d'avertissement

Voici une liste de symboles qui apparaissent en conjonction avec les avertissements sur le TwisTorr 305 FS Remote Controller. Le danger qu'ils décrivent est également illustré.

Le symbole triangulaire indique un avertissement. Les significations des symboles qui peuvent apparaître à côté des avertissements dans la documentation ou sur l'appareil lui-même sont les suivantes.



Tensions dangereuses



Danger générique



Déclaration européenne
de conformité



Site de fabrication



Certification CSA



Déchets d'équipements
électriques et
électroniques



Certification
RoHS Chine



Marquage UK CA

Mode d'emploi

Le symbole suivant peut être utilisé sur les étiquettes d'avertissement apposées sur l'appareil. Lorsque vous voyez ce symbole, reportez-vous au manuel d'utilisation ou d'entretien correspondant pour connaître la procédure correcte visée par cette étiquette d'avertissement.



Les symboles suivants apparaissent sur l'appareil pour votre information.

!	Danger générique
!	Tensions dangereuse
CE	Certification CE
CSA	Certification CSA
40	Certification RoHS Chine
—	Déchets d'équipements électriques et électroniques
UK CA	Marquage UK CA

Sécurité

Cette section contient les informations prescrites par la directive Machines 2015/14/30 CE, qui est essentielle à la conformité et au respect des règles de sécurité en général ainsi qu'à l'utilisation spécifique du produit.

Le non-respect de ces instructions et des autres instructions contenues dans le présent manuel peut rendre inefficaces les conditions de sécurité prévues dans la phase de conception et causer des accidents à ceux qui utilisent le produit.

Agilent Technologies décline toute responsabilité pour les dommages causés au produit ou pour la sécurité physique de l'opérateur ou des tiers résultant du non-respect des règles de sécurité indiquées dans la documentation technique.

Utilisation appropriée

Le présent manuel contient des avertissements importants et des instructions de sécurité à respecter pour que l'appareil puisse fonctionner en toute sécurité.

Le produit décrit dans le présent manuel est destiné exclusivement au domaine d'application spécifié dans les instructions. Le manuel fournit également des indications concernant les exigences essentielles pour l'application et le fonctionnement du produit ainsi que les mesures de sécurité qui peuvent être adoptées pour garantir un fonctionnement régulier. Agilent Technologies ne fournit aucune garantie ou n'assume aucune responsabilité pour des applications autres que celles décrites dans le présent manuel ou dans lesquelles les exigences essentielles et les mesures de sécurité ne sont pas respectées.

Le produit ne doit être utilisé que par un personnel qualifié capable de prendre les mesures de sécurité nécessaires dans des conditions qui ne causent pas de dommages ou de blessures. Tous les accessoires et équipements utilisés avec le produit doivent être fournis ou approuvés par Agilent Technologies.

Toute opération de réglage ou de maintenance doit être effectuée par un technicien professionnel informé des risques.

Les réparations du produit doivent être effectuées exclusivement par le personnel autorisé d'Agilent.

Mode d'emploi

Utilisation inappropriée

Agilent Technologies décline toute responsabilité en raison de l'utilisation inappropriée de le TwisTorr 305 FS Remote Controller.

Une utilisation inappropriée entraînera l'annulation de toutes les créances et garanties.

Une utilisation inappropriée est définie comme suit :

- installation de l'appareil à l'aide de matériel de montage inadapté
- utilisation dans un environnement exposé à de la condensation
- utilisation dans un environnement très humide en dehors de la plage spécifiée
- utilisation dans un environnement poussiéreux
- utilisation avec des tensions électriques non-conformes aux spécifications
- utilisation de l'appareil dans des zones exposées à des rayonnements ionisants
- utilisation dans des zones potentiellement explosives
- utilisation de l'appareil dans des systèmes soumis à des contraintes et des vibrations ou des forces périodiques qui affectent l'appareil.

Équipements de protection individuelle

Comme aucune intervention d'entretien n'est prévue sur cet appareil, tout autre équipement de protection n'est pas nécessaire.

AVERTISSEMENT Risques de blessure dus à la chute d'objets



Pendant le transport manuel des controller à vide, il existe un risque de glissement et de chute de la charge.

- Déplacer les contrôleurs en utilisant les deux mains.

Consignes de sécurité relatives aux contrôleurs de pompes turbomoléculaires

Les contrôleurs de pompes turbomoléculaires décrits dans ce manuel ne doivent pas être ouverts par l'utilisateur afin d'éviter les risques d'endommager les composants internes.

AVERTISSEMENT Pour éviter d'endommager les équipements et prévenir les risques de blessure des opérateurs, respectez rigoureusement les instructions d'installation fournies dans le présent manuel.



Transport et Emmagasinage

Pendant le transport et l'emmagasinage des contrôleurs, il faudra veiller à respecter les conditions environnementales suivantes :

- température: de - 20 °C à + 70 °C
- humidité relative: de 0% à 95 % (non condensante).

Description du produit

Cet appareillage a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice d'instructions ainsi que toute autre indication supplémentaire fournie par Agilent, avant l'utilisation de l'appareil. Agilent décline par conséquent toute responsabilité en cas d'inobservation totale ou partielle des instructions données, d'utilisation incorrecte de la part d'un personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques. Les contrôleurs de la série TwisTorr 305 FS Remote sont des convertisseurs de fréquence, contrôlés par un microprocesseur, réalisés avec des éléments à l'état solide et ayant des capacités d'autodiagnostic et d'autoprotection.

Caractéristiques du contrôleur:

- Caractère opérationnel de front /à distance / sériel
- Pilotage à 24 Vdc du ventilateur de refroidissement pompe
- Pilotage vent valve
- Lecture vitesse pompe suite à la commande d'arrêt (lecture vitesse d'arrêt)
- Lecture de pression si le manomètre FRG est connecté
- Interface Profibus (facultatif)
- Attribution automatique tension d'entrée
- Des informations détaillées sont fournies dans la section "Technical Information".

Installation

Préparation pour l'installation

Le contrôleur est fourni dans un emballage de protection spécial; si l'on constate des marques de dommages pouvant s'être produits pendant le transport, contacter aussitôt le bureau de vente local.

Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber le contrôleur et à ne lui faire subir aucun choc.

Ne pas jeter l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme aux directives CEE 85/399 en matière de protection de l'environnement.

Ne pas jeter les matériaux d'emballage sans autorisation. Le matériel est recyclable à 100 % et est conforme à la directive 94/62 de la CEE et aux modifications ultérieures.

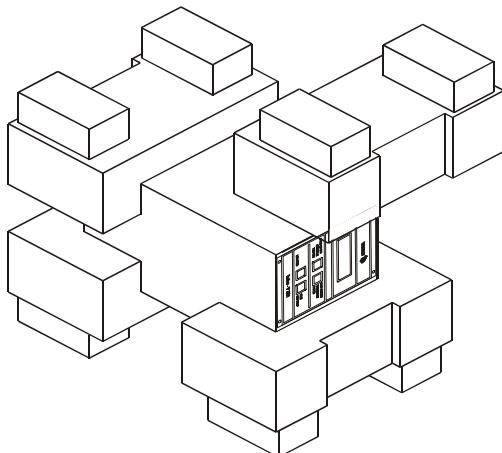


Figure 9 Emballage des Contrôleurs TwisTorr 305 FS Remote

Set-up

AVERTISSEMENT



Pour la sécurité de l'utilisateur, le contrôleur ne doit être utilisé qu'en intérieur et doit être branché au moyen d'un câble d'alimentation à 3 fils (cf. tableau des pièces de rechange qui peuvent être commandées) avec une fiche du type approuvé au niveau international. Afin d'éviter toute décharge électrique et satisfaire aux conditions requises CE, il faut toujours utiliser ce câble d'alimentation, en introduisant la fiche dans une prise électrique pourvue d'un branchement approprié à la terre. A l'intérieur du contrôleur se développent de hautes tensions qui peuvent causer de graves dommages et même la mort. Avant d'effectuer toute opération d'installation ou d'entretien du contrôleur, le débrancher de la prise d'alimentation.

AVERTISSEMENT



Cordon d'alimentation électrique : le câble correct du raccordement électrique est un câble à trois fils (Ph+N+Terre). La section des fils doit être au moins de 1,0 mm² en présence d'une tension d'alimentation de 240 Vca ou de 2 mm² si la tension d'alimentation est de 120 Vca, en présence d'un câble de référence d'une longueur égale à 3 m.

NOTE

Le contrôleur peut être installé sur une table ou à l'intérieur d'un rack prévu à cet effet. Il est en tout cas nécessaire que l'air de refroidissement puisse circuler librement à l'intérieur de l'appareil. Ne pas installer et/ou utiliser le contrôleur dans des milieux exposés à des agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz de combat ainsi que dans des milieux explosifs ou à risque élevé d'incendie.

Pendant le fonctionnement, il est nécessaire de respecter les conditions environnementales suivantes :

- température: de +5 °C à +45 °C
- humidité relative: de 0 % à 95 % (non condensante).

Pour les autres connexions et pour l'installation des accessoires en option, voir la section "Technical Information".

Montage du Contrôleur TwisTorr 305 FS Remote

Dans ce paragraphe, on indique les principales procédures opérationnelles.

Pour tous autres détails et pour les procédures concernant des connexions ou des éléments en option, se reporter au paragraphe "Use" de l'appendice "Technical Information".

Avant d'utiliser le contrôleur, effectuer toutes les connexions électriques et pneumatiques et consulter le manuel d'utilisation de la pompe TwisTorr 305 FS.

AVERTISSEMENT



Pour éviter tous dommages aux personnes et à l'appareil, si la pompe est placée sur un plateau d'appui s'assurer que ce dernier est stable. Ne jamais faire fonctionner la pompe si la bride d'entrée n'est pas connectée au système ou n'est pas fermée à l'aide de la bride de fermeture.

NOTE

Une fois connecté à la tension de ligne, pour faire fonctionner le contrôleur de manière très simple, connectez sur le connecteur J1 le connecteur homologue précâblé qui est fourni avec le contrôleur.

Le connecteur homologue précâblé est un moyen simple et rapide de permettre au contrôleur d'être utilisé (par exemple, en agissant sur le panneau avant), sans avoir besoin de mettre en œuvre d'autres connexions externes câblées comme Serial Com ou Remote I/O.

La pompe à pré-vide et la pompe TwisTorr 305 FS peuvent être mises en marche simultanément

Commandes, Indicateurs et Connecteurs

On présente ci-dessous le tableau de commande du Contrôleur ainsi que les tableaux d'interconnexion.

Des informations détaillées sont fournies dans la section "Technical Information".

Description du Tableau avant

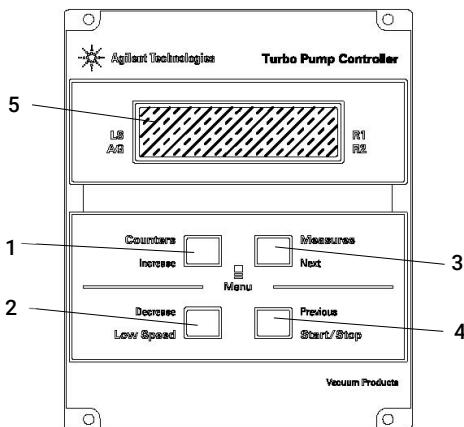


Figure 10 Tableau avant du Contrôleur TwisTorr 305 FS Remote

-
- 1 Interrupteur rappelant sur l'afficheur les paramètres de cycle number, cycle time et pump life.
 - 2 Interrupteur de sélection du mode LOW SPEED. Il n'est actif que lorsque le mode de commande est sélectionné depuis le tableau frontal. En le pressant une fois, la pompe tourne à vitesse "stand-by". En le pressant une deuxième fois, on désactive le mode LOW SPEED.
 - 3 Interrupteur rappelant sur l'afficheur les paramètres de pump current, pump temperature, pump power et rotational speed. Il est toujours actif, indépendamment du mode de fonctionnement choisi. En pressant simultanément les interrupteurs 3 et 1 pendant 2 secondes au moins, on active un programme avec lequel il est possible de programmer certains paramètres opérationnels.
 - 4 Interrupteur envoyant les commandes de START, STOP/RESET. Il n'est actif que lorsque le mode de commande est sélectionné depuis le tableau frontal. Une première pression de l'interrupteur active la phase de mise en marche; une deuxième pression provoque l'arrêt de la pompe. Si la pompe s'est arrêtée automatiquement à cause d'une panne, il faut presser cet interrupteur une première fois pour effectuer la mise à zéro du contrôleur et une deuxième fois pour remettre la pompe en marche.
 - 5 Ecran alphanumérique à cristaux liquides: matrice de points, 2 lignes x 16 caractères.
-

Mode d'emploi

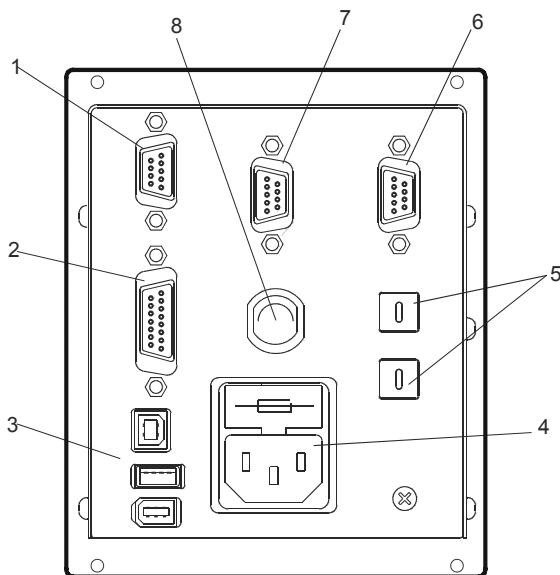


Figure 11 Tableau arrière du Contrôleur TwisTorr 305 FS Remote

-
- 1 Connecteur d'entrée des signaux logiques (le connecteur d'enclenchement est doté de la barrette de réenclenchement spéciale).
 - 2 Connecteur signaux logiques en sortie et monitorage fréquence pompe plus sortie analogique programmables.
 - 3 Connecteur de sortie alimentation (24 Vdc pour le ventilateur de refroidissement pompe, vent valve et calibre).
 - 4 Module d'entrée alimentation contrôleur qui comprend les fusibles, la prise d'alimentation et le filtre ENC.
 - 5 Interrupteur à rotation pour établir l'adresse du Profibus.
 - 6 Profibus (facultatif).
 - 7 Connecteur série pour contrôle à distance.
 - 8 Connecteur pompe.
-

Démarrage et utilisation du Contrôleur TwisTorr 305 FS Remote

Allumage du Contrôleur

Pour allumer le contrôleur, il suffit d'introduire le câble d'alimentation dans la prise du réseau.

Mise en marche de la Pompe

Pour faire démarrer la pompe il faut habiliter l'entrée de interlock et appuyer sur la touche START du panneau avant.

Arrêt de la Pompe

Pour arrêter la pompe, presser l'interrupteur STOP du tableau frontal.

Démarrage progressif

AVERTISSEMENT



Pour garantir la lubrification correcte des roulements de la pompe turbo, lors du premier démarrage après l'installation, le contrôleur paramètre de manière automatique (non désactivable par l'utilisateur) une rampe de démarrage progressif de la pompe appelée « Soft Start » (la pompe est mise en rotation pour les paliers de vitesse successifs). Une fois que le « Soft Start » s'est achevé avec succès, les démarrages suivants se dérouleront en mode normal, puis en suivant une rampe d'augmentation continue (et non plus par paliers).

En cas d'utilisation d'une nouvelle pompe avec une unité de commande usagée, n'oubliez pas de régler manuellement le mode de démarrage progressif. Le mode Démarrage progressif prend plus de temps que le mode Démarrage standard ; l'utilisateur doit attendre que la pompe atteigne complètement sa vitesse avant de l'arrêter.

Après le premier démarrage, la pompe ne sera plus démarrée en mode Démarrage progressif par l'unité de commande.

L'utilisateur peut choisir de démarrer la pompe en utilisant la rampe « Soft Start », si nécessaire, à partir de la commande série (ou à distance), comme indiqué en détail dans le chapitre « Informations techniques » (voir respectivement les paragraphes « Signification des fenêtres » - en cas d'utilisation de la commande série – et le paragraphe « Connexion du régulateur », P1 - Entrée – à distance).

NOTE

Quand le mode Soft Start est activé (qu'il ait été démarré automatiquement par le contrôleur au moment du premier démarrage ou activé manuellement par l'utilisateur), le contrôleur donne des indications en affichant sur l'écran:

- le message « SOFT START MODE ».
- une barre d'indication qui évolue de manière proportionnelle à la progression des paliers de vitesse.

L'indicateur à barres s'affiche dans l'angle supérieur droit de l'écran (réf. flèche A) en plus et en même temps que les autres messages déjà affichés sur celui-ci. Le message « SOFT START MODE » s'affiche sur l'écran alternativement aux autres messages (réf. flèche B) et reste affiché en permanence pendant environ 3 secondes. Quand l'écran du contrôleur n'affiche plus l'indicateur à barres ni le message STARTING en alternance avec le message SOFT START MODE, mais qu'il affiche uniquement le message NORMAL, le SOFT START s'est déroulé avec succès.

Pendant le démarrage progressif automatique (premier démarrage), si cette opération est interrompue avant la fin (par exemple le contrôleur s'arrête suite à une défaillance du réseau ou un message STOP est envoyé au contrôleur), le contrôleur réactivera automatiquement la rampe de démarrage progressif lors du prochain redémarrage.

Mode d'emploi

Pendant le « Soft Start » (démarrage progressif) (qu'il soit automatique ou réglé par l'utilisateur) et jusqu'à ce qu'il soit terminé, l'état indiqué par la fenêtre série spécifique (voir le chapitre « Informations techniques », paragraphe « Signification des fenêtres ») correspond à « 2 », c'est-à-dire « Ramp ». Une fois le Soft Start terminé, s'il s'est déroulé correctement, l'état indiqué par la fenêtre série spécifique correspond à « 5 », soit « Normal ».

Écran d'indication au début du Soft Start : l'écran indique alternativement STARTING avec l'indicateur à barres et le message « SOFT START MODE ».



Écran d'indication quand Soft Start est en cours : l'indicateur à barres évolue au fur et à mesure que les paliers de vitesse augmentent.



Mode d'emploi

Écran d'indication une fois Soft Start terminé : le message SOFT START MODE ne s'affiche plus sur l'écran, l'indicateur à barres non plus, et le message STARTING est remplacé par le message NORMAL.



NOTE

Après une longue période d'inactivité (60 jours ou plus), afin de permettre à nouveau la redistribution correcte de la graisse présente dans les roulements, il est nécessaire de redémarrer la pompe en mode Démarrage progressif.

Des informations détaillées sont fournies dans la section "Technical Information".

Messages d'erreur

Dans certains cas de panne, l'ensemble de circuits d'autodiagnostic du contrôleur présente certains messages d'erreur indiqués dans le tableau ci-dessous.

Tab. 3 Messages d'erreur

Message	Description	Intervention
RUN UP TIME	La pompe n'a pas pu atteindre une valeur de vitesse > 700 Hz, dans les limites de la valeur attendue (temps de démarrage, qui est configurable).	Vérifiez la configuration du temps de démarrage : elle doit être définie en fonction du processus client. Vérifiez la charge de gaz à l'intérieur de la pompe et spécifiez-la en conséquence. Vérifiez que le rotor de la pompe peut tourner librement. Redémarrez la pompe.
CHECK CONNECTION TO PUMP	Dysfonctionnement de la connexion entre la pompe et le contrôleur. Ou bien La pompe a une température inférieure à a 0 °C.	S'assurer que le câble de connexion entre la pompe et le contrôleur et le contrôleur est bien fixé aux deux extrémités et qu'il n'est pas coupé. Presser deux fois l'interrupteur START pour réactiver la pompe.
WAITING INTERLOCK	Le signal d'interlock situé sur le connecteur P1 est actif à cause de la coupure du court-circuit entre le pin 3 et le pin 8 du connecteur J1 ou à cause de l'ouverture du signal d'interlock extérieur.	Rétablissement le court-circuit entre le pin 3 et le pin 8 du connecteur P1 ou fermer le signal d'interlock extérieur.
PUMP OVERTEMP.	La température du corps de la pompe a dépassé la limite supérieure maximale autorisée, selon le type de gaz sélectionné (Ar : 50 °C ; N2 : 55 °C ; He : 60 °C).	Attendre que la température retourne au-dessous du seuil. Presser deux fois l'interrupteur START pour remettre la pompe en marche.
CONTROLLER OVERTEMP.	La température du contrôleur a dépassé 70 °C. Ou bien La température du radiateur du contrôleur est supérieure à 60 °C.	Attendre que la température retourne au-dessous du seuil. Presser deux fois l'interrupteur START pour remettre la pompe en marche.
TOO HIGH LOAD	Le courant absorbé par la pompe est plus grand que celui qui a été programmé.	S'assurer que le rotor de la pompe a la possibilité de tourner librement. Presser deux fois l'interrupteur START pour remettre la pompe en marche.

Mode d'emploi

Tab. 3 Messages d'erreur

SHORT CIRCUIT	Pendant le fonctionnement normal (après la phase de mise en marche), la connexion de sortie est en court-circuit.	Vérifier les connexions entre la pompe et le contrôleur. Presser deux fois l'interrupteur START pour remettre la pompe en marche.
SYSTEM OVERRIDE	La pompe a été arrêtée par un signal d'alerte provenant d'un contact éloigné.	Débrancher le câble d'alimentation du contrôleur et corriger la cause de l'alerte. Reconnecter le câble d'alimentation et presser deux fois l'interrupteur START pour remettre la pompe en marche.
OVERVOLTAGE	Il s'est produit une panne de la section d'alimentation du contrôleur, ou bien le contrôleur a reçu un faux signal.	Presser deux fois l'interrupteur START pour remettre la pompe en marche. Si le message se présente à nouveau, s'adresser à Agilent pour l'entretien.
RUN UP TIME	Interruption du démarrage.	Vérifiez la configuration du temps de démarrage. Elle doit être ajustée en fonction du processus du client. Vérifiez la quantité de charge de gaz qui s'écoule à l'intérieur de la pompe.

Entretien

Les contrôleurs de la série TwisTorr 305 FS Remote n'exigent aucun entretien. Toute opération doit être effectuée par un personnel agréé.

En cas de panne, il est possible de s'adresser au Service de réparation Agilent ou bien au "Agilent advance exchange service" qui permet d'obtenir un contrôleur régénéré à la place du contrôleur détraqué.

AVERTISSEMENT Avant d'effectuer toute opération sur le contrôleur, débrancher le câble d'alimentation.



Si un contrôleur doit être misé au rebut, il faut respecter les normes nationales spécifiques en vigueur.

Élimination

Signification du logo « DEEE » présent sur les étiquettes.

Le symbole représenté ci-dessous est apposé conformément à la directive CE dite « DEEE ».

Ce symbole (valable uniquement pour les pays de la Communauté européenne) indique que le produit sur lequel il est apposé NE DOIT PAS être éliminé avec des déchets ménagers ou industriels communs mais qu'il doit être confié à un centre de collecte sélective. L'utilisateur est donc invité à contacter le fournisseur du produit, qu'il s'agisse du fabricant ou d'un revendeur, pour donner lieu au processus de collecte et d'élimination, après avoir vérifié les conditions générales de vente.



Figure 12 Logo « DEEE »

Pour plus de précisions, veuillez consulter :
<http://www.agilent.com/environment/product/index.shtml>

Service

Si, vous, le client avez besoin d'un service d'échange ou de réparation avancé, veuillez contacter le distributeur local ou directement par courrier à:

vpt-customercare@agilent.com

vpl-customercare@agilent.com

Vous devez remplir le formulaire de "Request for Return" pour retourner votre pompe à Agilent pour l'entretien (fourni à la fin du présent manuel).

4

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Acerca del manual

Validez

Este manual enumera las instrucciones para los usuarios de la bomba TwisTorr 305 FS Remote Controller, con particular referencia a la información relacionada con la seguridad, la operación y el mantenimiento de primer nivel que está limitado a las operaciones de mantenimiento que son responsabilidad del usuario.

Las operaciones de mantenimiento, ilustradas en las secciones particulares, con disposiciones específicas relacionadas con el nivel más elevado de mantenimiento (personal específicamente capacitado para las operaciones de mantenimiento) no deben ser realizadas por el usuario.

Para una instalación y arranque/parada correctos, consulte el párrafo "Instalación".

Para una instalación y un encendido/apagado correctos, consulte la sección "Technical Information".

NOTA

- 1** Este manual contiene información útil para que todo el personal que utilice la bomba TwisTorr 305 FS Remote Controller pueda operarla de manera segura y garantizar un rendimiento perfecto, durante toda su vida útil.
 - 2** Guarde este manual, junto con todas las publicaciones relacionadas, en un lugar conocido y accesible para todos los operadores/personal de mantenimiento.
-

Definiciones y terminología

Definición de Precaución, Advertencia y Nota

Algunas referencias importantes de este manual están resaltadas y enmarcadas en color contrastante.

PRECAUCIÓN Los mensajes de precaución se muestran antes de los procedimientos que, si no se respetan, pueden causar daños al equipo.

ADVERTENCIA  Los mensajes de advertencia llaman la atención del operador sobre un procedimiento o práctica específica que, si no se realiza correctamente, puede causar lesiones personales graves.

NOTA

Las notas están previstas para llamar la atención sobre información importante y proporcionar más detalles en relación con pasos específicos.

Símbolos de advertencia

La siguiente es una lista de los símbolos que aparecen en conjunto con las advertencias en la bomba TwisTorr 305 FS Remote Controller. También se muestra el peligro que describen.

Un símbolo triangular indica una advertencia. Los significados de los símbolos que pueden aparecer junto a las advertencias en la documentación son los siguientes:



Voltajes peligrosos



Peligro genérico



Declaración Europea
de Conformidad



Lugar de fabricación



Certificación CSA



Equipo de Desecho
Eléctrico y Electrónico



Certificación China
RoHS



Marca UK CA

Instrucciones de uso

El siguiente símbolo podría utilizarle en las etiquetas de advertencia fijadas al instrumento. Cuando vea este símbolo, consulte la operación relevante o el manual de servicio para el procedimiento referido por dicha etiqueta de advertencia.



Los siguientes símbolos aparecen en el instrumento para su información.

	Peligro genérico
	Voltajes peligrosos
	Certificación CE
	Certificación CSA
	Certificación China RoHS
	Equipo de Desecho Eléctrico y Electrónico
	Marca UK CA

Seguridad

La presente sección contiene la información, prescrita por la Directiva de Maquinaria 2015/14/30 EC, que es esencial para el cumplimiento y seguimiento de las normativas de seguridad, tanto generales como en relación con el uso específico del producto.

El incumplimiento de las presentes instrucciones y las otras instrucciones en el presente manual pueden hacer que las condiciones de seguridad previstas en la fase de diseño sean ineficaces y causen accidentes a los que operen el producto.

Agilent Technologies niega cualquier responsabilidad por daños al producto o la seguridad física del operario o terceras partes derivados del incumplimiento de las reglas de seguridad indicadas en la documentación técnica.

Uso correcto

El presente manual contiene advertencias importantes e instrucciones de seguridad a cumplir para que la unidad funcione de manera segura.

El producto descrito en el presente manual está destinado exclusivamente al área de aplicación especificado en las instrucciones. El manual también proporciona indicaciones acerca de los requisitos esenciales para la aplicación y funcionamiento del producto, así como las medidas de seguridad que pueden ser adoptadas para garantizar el funcionamiento regular. Agilent Technologies no proporciona ninguna garantía ni asume ninguna responsabilidad por aplicaciones que no sean las descritas en el presente manual, o en las que no se respeten los requisitos y medidas de seguridad esenciales.

El producto solo puede ser utilizado por personal cualificado que pueda tomar las medidas de seguridad necesarias bajo condiciones que no causen daños o lesiones. Cualquier accesorio y equipo utilizado con el producto debe ser proporcionado o aprobado por Agilent Technologies.

Cualquier ajuste u operación de mantenimiento debe ser realizada por un técnico profesional informado sobre los riesgos.

Las reparaciones del producto deberán ser realizadas exclusivamente por personal autorizado por Agilent.

Instrucciones de uso

Uso incorrecto

Agilent Technologies niega cualquier responsabilidad derivada del uso incorrecto del TwisTorr 305 FS Remote Controller.

El uso incorrecto anulará todas las reclamaciones por responsabilidad y garantías.

El uso incorrecto se define como:

- instalación del dispositivo con material de montaje no especificado
- funcionamiento en un entorno de condensación
- funcionamiento en entornos de alta humedad fuera del rango especificado
- funcionamiento en entornos polvorientos
- funcionamiento con voltajes no especificados
- funcionamiento del dispositivo en áreas con radiación ionizante
- funcionamiento en zonas potencialmente explosivas
- uso del dispositivo en sistemas en los que la fuerza de impacto y las vibraciones o fuerzas periódicas afecten al dispositivo.

Instrucciones de uso

Equipo de protección

Como no se prevé mantenimiento para este dispositivo, no es necesario ningún otro equipo de protección.

ADVERTENCIA

Riesgo de lesiones debido a la caída de objetos



Cuando se transportan los Controler de vacío manualmente, existe el peligro de que las cargas se resbalen y caigan.

- Traslade los Controler con las dos manos.

Pautas de seguridad para Controler de bombas turbomoleculares

Los Controler de bombas turbomoleculares descritos en el siguiente manual de funcionamiento no deben ser abiertos por el usuario para evitar el riesgo de dañar los componentes internos.

ADVERTENCIA

Para evitar daños al equipo y prevenir lesiones al personal operativo, se deben cumplir estrictamente las instrucciones de instalación indicadas en este manual.



Transporte y almacenamiento

Durante el transporte y el almacenamiento de los controlers se deberá cumplir con las condiciones ambientales siguientes:

- temperatura: de -20 °C a +70 °C
- humedad relativa: 0 ÷ 95% (no condensadora).

Descripción del producto

Este equipo se ha concebido para un uso profesional. El usuario deberá leer atentamente el presente manual de instrucciones y cualquier otra información suplementaria facilitada por Agilent antes de utilizar el equipo. Agilent se considera libre de cualquier responsabilidad debida al incumplimiento total o parcial de las instrucciones, al uso poco apropiado por parte de personal sin formación, a las operaciones no autorizadas o al uso que no cumpla con las normas nacionales específicas. Los controlers de la serie TwisTorr 305 FS Remote son convertidores de frecuencia, controlados por un microprocesador, realizados con componentes en estado sólido y con capacidad de autodiagnóstico y autoprotección.

Características del controler:

- Operatividad frontal / remoto / serial
- Pilotaje de 24 Vdc del ventilador de refrigeración bomba
- Pilotaje vent valve
- Lectura velocidad bomba después de activación mando de parada (lectura velocidad de parada)
- Lectura de presión si el manómetro FRG está conectado
- Interfaz Profibus (opcional)
- Configuración automática tensión de entrada.

Una información más detallada se facilita en la sección "Technical Information".

Instalación

Preparación para instalación

Il controller viene fornito in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere il controller e a non sottoporlo ad urti.

No tire los materiales de embalaje de manera no autorizada. El material es 100% recicitable y cumple con la Directiva EEC 94/62 y modificaciones posteriores.

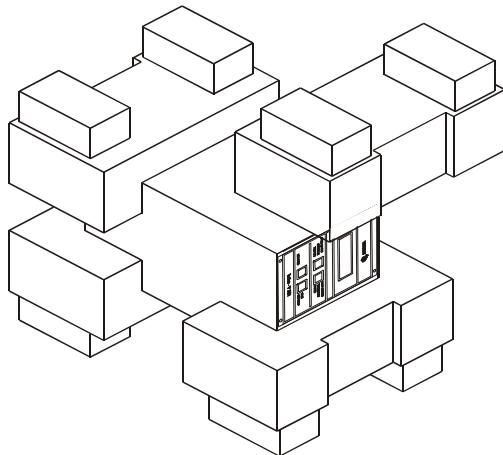


Figura 13 Embalaje de los TwisTorr 305 FS Remote Controller

Puesta en marcha

ADVERTENCIA



El controlador está diseñado sólo para su uso en interiores y para mantener la seguridad del usuario debe ser alimentado mediante un cable de 3 conductores (v. tabla de las piezas de recambio solicitables) con un tipo de clavija aprobado a nivel internacional. Para evitar el riesgo de descargas eléctricas y cumplir con los requisitos CE, utilizar siempre este cable de alimentación, conectando la clavija a una toma eléctrica dotada con una adecuada conexión a tierra. Dentro del controlador se desarrollan altas tensiones que pueden causar graves daños o la muerte. Antes de efectuar cualquier operación de instalación o mantenimiento del controlador, desconectarlo del enchufe de alimentación.

ADVERTENCIA



Cable de alimentación: el cable correcto para el cableado eléctrico es un cable de tres hilos (Ph + N + Tierra).

La sección del cable debe ser de al menos 1,0 mm² en el caso de una fuente de alimentación de 240 Vac o 2 mm² en el caso de una fuente de alimentación de 120 Vac para una longitud de cable de referencia de 3 m.

NOTA

El TwisTorr 305 FS Remote Controller puede instalarse en una mesa o dentro de un rack específico. En cualquier caso, es necesario que el aire de refrigeración pueda circular libremente alrededor del aparato. No instalar y/o utilizar el controler en ambientes expuestos a agentes atmosféricos (lluvia, hielo y nieve), polvos, gases agresivos, en ambientes explosivos o con alto riesgo de incendio.

Durante el funcionamiento es necesario que se respeten las condiciones ambientales siguientes:

- temperatura: de +5 °C a +45 °C
- humedad relativa: 0 – 95 % (no condensadora).

Para otras conexiones y la instalación de los accesorios opcionales, véase la sección "Technical Information".

Montaje del TwisTorr 305 FS Remote Controller

En este apartado se citan los procedimientos operativos principales.

Para la instalación de accesorios opcionales, consulte "Technical Information".

Antes de usar el controlador, haga todas las conexiones eléctricas y neumáticas y consulte el manual de instrucciones de la bomba TwisTorr 305 FS.

ADVERTENCIA



Para evitar lesiones a las personas y al aparato, si la bomba está apoyada sobre una mesa cerciorarse que es estable. No poner en marcha nunca la bomba si la brida de entrada no está conectada al sistema o no está cerrada con la brida de cierre.

NOTA

Una vez conectado a la línea de voltaje, para operar el controlador de una manera muy simple, conecte en el conector J1 el conector de acoplamiento precableado que se suministra junto con el controlador.

El conector de acoplamiento precableado es una forma simple y rápida de permitir que el controlador sea operado (por ejemplo, actuando en el panel frontal), sin tener la necesidad de implementar otras conexiones externas cableadas como Serial Com o Remote I/O.

La bomba pre-vacío y la bomba TwisTorr 305 FS pueden encenderse simultáneamente.

Mandos, Indicadores y Conectores

A continuación se ilustran el panel de mando del controler y los paneles de interconexión. Para más detalles consultar la sección "Technical Information".

Descripción del panel frontal

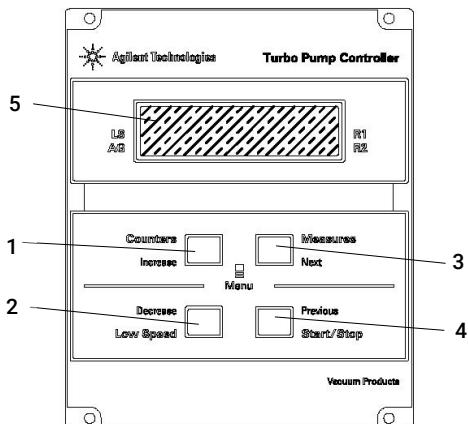


Figura 14 Panel frontal del TwisTorr 305 FS Remote Controller

-
- 1 Pulsador para que aparezcan en el display los parámetros cycle number, cycle time y pump life.
 - 2 Pulsador para la selección del modo LOW SPEED. Está activado sólo cuando está seleccionado el modo de mando del panel frontal. Apretando una vez, la bomba gira a velocidad "stand-by". Apretándolo una vez más se desactiva el modo LOW SPEED.
 - 3 Pulsador para que aparezcan en el display los parámetros pump current, pump temperature, pump power y rotational speed. Está siempre activado independientemente del modo de funcionamiento elegido. Apretando juntos los pulsadores 3 y 1 durante 2 segundos por lo menos, se activa un programa con el cual se pueden programar algunos parámetros operativos.
 - 4 Pulsador para enviar los mandos de START, STOP/RESET. Está activo sólo cuando se selecciona el modo de mando del panel frontal. Apretándolo una vez se activa la fase de puesta en marcha; apretándolo otra vez se para la bomba. Si la bomba se ha parado automáticamente a causa de una avería, hay que apretar este pulsador primero una vez para efectuar el reset del controler y la segunda vez para volver a poner en marcha la bomba.
 - 5 Display alfanumérico de cristales líquidos: matriz de puntos, 2 líneas x 16 caracteres.
-

Instrucciones de uso

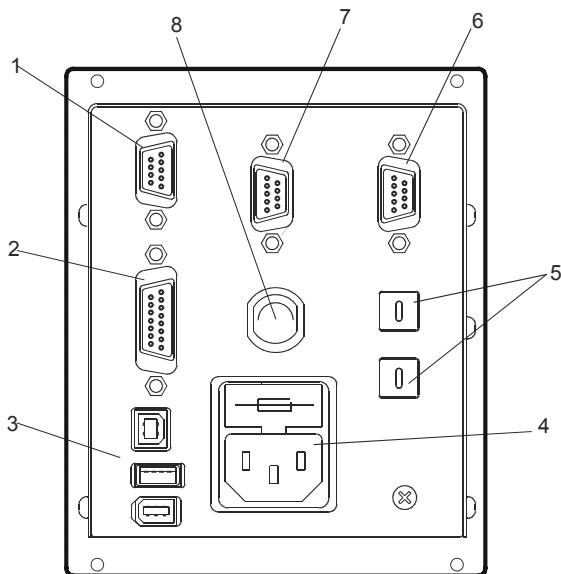


Figura 15 Panel trasero del TwisTorr 305 FS Remote Controller

-
- 1 Conector de entrada de las señales lógicas (el conector de acoplamiento se suministra con el conector puente específico de cierre).
 - 2 Conector señales lógicas en salida y monitoreo frecuencia bomba y salida analógica programable.
 - 3 Conector de salida alimentación (24 Vdc para el ventilador de refrigeración bomba, vent valve y calibre).
 - 4 Módulo de entrada alimentación controlador con fusibles, toma de alimentación y filtro ENC.
 - 5 Conmutador de rotación para configurar la dirección del Profibus.
 - 6 Profibus (opcional).
 - 7 Conector serial para control remoto.
 - 8 Conector bomba.
-

Puesta en marcha y funcionamiento del TwisTorr 305 FS Remote Controller

Encendido del controler

Para encender el controler es suficiente introducir el cable de alimentación en la toma de red.

Puesta en marcha de la Bomba

Para activar la bomba es necesario habilitar la entrada de interlock y pulsar el botón START situado en el panel frontal.

Parada de la Bomba

Para detener la bomba hay que apretar el pulsador STOP del panel frontal.

Arranque suave (Soft Start)

ADVERTENCIA



Durante la primera activación y después de la fase de instalación, con el fin de asegurar la lubricación correcta de los cojinetes de la turbo bomba, el controlador configurará automáticamente (no puede ser desactivado por el usuario) una rampa de activación gradual de dicha bomba, llamada Arranque Suave (Soft Start) (la bomba será posicionada en rotación mediante pasos de velocidad en sucesión). Una vez que el modo Soft Start se ha completado correctamente, las siguientes activaciones se realizarán según el modo normal, esto es, con una rampa ascendente continua (y ya no por pasos). En caso de utilizar una bomba nueva con una unidad de control usada, recuerde configurar manualmente el modo de arranque suave.

El modo de arranque suave tardará más tiempo comparado con el arranque normal; el usuario debe esperar a que la bomba haya alcanzado la velocidad completamente antes de detener la bomba.

Después del primer arranque, la unidad de control no iniciará la bomba en el modo de arranque suave de nuevo.

El usuario puede eventualmente decidir arrancar la bomba usando la rampa de Arranque Suave (Soft Start) según sea necesario, actuando en el comando serial apropiado (o en la entrada remota apropiada), como se detalla en el capítulo "Technical Information" (referir respectivamente en los párrafos "Window Meanings" - para serie - y en el párrafo "Controller Connection", "P1 – Input" - para entrada remota).

NOTA

Cuando el Modo de Arranque Suave (Soft Start), está activado (iniciado automáticamente por el controlador en el primer arranque o activado manualmente por el operador), el controlador mostrará en pantalla el mensaje correspondiente:

- mensaje "SOFT START MODE"
- indicador de barra che varía en función de la evolución de la velocidad.

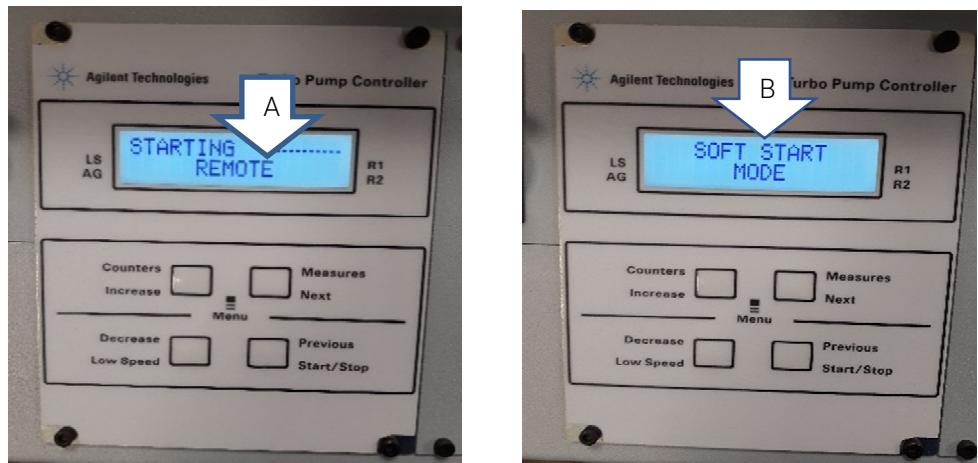
El indicador de barra aparece en la esquina superior derecha de la pantalla (Flecha de ref A) adicionada y en simultaneidad con los mensajes ya presentes en la misma. El mensaje "SOFT START MODE", por el contrario, aparece en pantalla de modo alternado respecto al resto de mensajes (Flecha de ref B) y permanece visible de forma estable durante aproximadamente 3 segundos. Cuando en la pantalla del controlador ya no aparece el indicador de barra ni el mensaje STARTING de forma alternada al mensaje SOFT START MODE, y se muestra solo el mensaje NORMAL, significa que la activación en SOFT START ha sido completada con éxito.

Durante la activación automática en modo SOFT START (primera activación), en caso de que se debiera interrumpir antes de haber sido completada (por ejemplo, desactivación del controlador por una falla de red o porque se ha enviado un mensaje de STOP), en el siguiente reinicio el controlador reactivará la rampa de Soft Start de forma automática.

Instrucciones de uso

Durante el Arranque Suave (Soft Start) (ya sea automático o impuesto por el usuario), y hasta su finalización, el estado indicado por la ventana de serie específica (consultar el capítulo "Technical Information", párrafo "Window Meanings") es "2" que indica " Rampa ". Una vez completado el Arranque Suave (Soft Start), si se realiza con éxito, el estado indicado por la ventana de serie específica es "5", que indica "NORMAL".

Indicaciones de la pantalla a inicio del modo Soft Start: la pantalla indica STARTING y muestra el indicador de barra, alternándose al mensaje "SOFT START MODE".



Indicaciones de visualización con Soft Start en curso: el indicador de barra evoluciona a medida que Aumentan los pasos de velocidad.



Instrucciones de uso

Indicaciones en pantalla con Soft Start completado: en pantalla ya no aparece el mensaje SOFT START MODE ni el indicador de barra. El mensaje STARTING es reemplazado por NORMAL.



NOTA

Después de un periodo de inactividad largo (60 días o más), para permitir de nuevo la redistribución correcta de la grasa presente en los cojinetes, es necesario arrancar la bomba mediante el modo de arranque suave de nuevo.

Para informaciones detalladas, consulte la sección "Technical Information".

Mensajes de error

En algunos casos de avería los circuitos de autodiagnosis del controler presenta algunos mensajes de error detallados en la tabla siguiente.

Tab. 4 Mensajes de erro

Mensaje	Descripción	Acción Correctiva
RUN UP TIME	La bomba no ha podido alcanzar un valor de velocidad >700 Hz, dentro del valor esperado (Tiempo puesta en funcionamiento, que es configurable).	Compruebe la configuración del tiempo de puesta en funcionamiento: debería establecerse según el proceso del cliente. Compruebe la carga de gas que fluye dentro de la bomba y ajuste de manera adecuada. Compruebe que el rotor de la bomba pueda girar libremente. Reinicie la bomba.
CHECK CONNECTION TO PUMP	Mal funcionamiento en la conexión entre la bomba y el Controler. O bien La bomba tiene una temperatura inferior a 0 °C.	Comprobar que el cable de conexión entra en la bomba y el controler está bien fijado por ambos extremos y no está interrumpido. Apretar dos veces el pulsador START para volver a poner en marcha la bomba.
WAITING INTERLOCK	Está activa la señal de interlock presente en el conector P1 a causa de la interrupción del cortocircuito entre el pin 3 y el pin 8 del conector J1, o a causa de la apertura de la señal de interlock externo.	Eliminar el cortocircuito entre el pin 3 y el pin 8 del conector P1, o cerrar la señal de interlock exterior.
PUMP OVERTEMP.	La temperatura del cuerpo de la bomba ha excedido el límite máximo permitido, que depende del tipo de gas seleccionado (Ar: 50°C; N2: 55°C; He: 60°C).	Esperar a que la temperatura vuelva por debajo del umbral. Apretar dos veces el pulsador START para volver a poner en marcha la bomba.
CONTROLLER OVERTEMP.	La temperatura del controler ha superado los 70 °C. O bien La temperatura del radiador del controler es superior a 60 °C.	Esperar a que la temperatura vuelva por debajo del umbral. Apretar dos veces el pulsador START para volver a poner en marcha la bomba.
TOO HIGH LOAD	La corriente absorbida por la bomba es superior a la programada.	Comprobar que el rotor de la bomba tiene la posibilidad de girar libremente. Apretar dos veces el pulsador START para volver a poner en marcha la bomba.

Instrucciones de uso

Tab. 4 Mensajes de erro

SHORT CIRCUIT	Durante el funcionamiento normal (tras la fase de puesta en marcha) la conexión de salida está en cortocircuito.	Comprobar las conexiones entre la bomba y el controler. Apretar dos veces el pulsador START para volver a poner en marcha la bomba.
SYSTEM OVERRIDE	La bomba ha sido parada por una señal de emergencia procedente de un contacto remoto.	Desenchufar el cable de alimentación del controler y corregir la causa de la emergencia. Volver a conectar el cable de alimentación y apretar dos veces el pulsador START para volver a poner en marcha la bomba.
OVERVOLTAGE	Se ha producido una avería en la sección de alimentación del controler o el controler ha recibido una señal espurio.	Apretar dos veces el pulsador START para volver a poner en marcha la bomba. Si el mensaje se vuelve a presentar dirigirse a Agilent para el mantenimiento.
RUN UP TIME	Tiempo de arranque agotado.	Controlar la configuración del tiempo de arranque. Debe ajustarse según el proceso del cliente. Comprobar la cantidad de carga de gas que fluye dentro de la bomba.

Mantenimiento

Los controlers de la serie TwisTorr 305 FS Remote no necesitan ningún mantenimiento. Cualquier operación ha de ser efectuada por personal autorizado. En caso de avería es posible utilizar el servicio de reparación Agilent o del "Agilent advance exchange service", que permite obtener un controler regenerado en vez del averiado.

ADVERTENCIA

Antes de efectuar cualquier operación en el controler desenchufar el cable de alimentación.



En caso de que un controler se tenga que desguazar, efectuar su eliminación respetando las normas nacionales específicas.

Eliminación

Significado del logo “WEEE” que se encuentra en las etiquetas.

El siguiente símbolo se aplica de acuerdo con la Directiva WEEE (Residuos de Aparatos Eléctricos y Electrónicos, por sus siglas en inglés) de la CE.

Este símbolo (válido solo en los países de la Comunidad Europea) indica que el producto en el que se aplica NO debe desecharse con la basura doméstica o industrial común, sino que debe enviarse a un sistema de recolección diferenciada. Se invita al usuario final a comunicarse con el proveedor del dispositivo, ya sea directamente con la Casa Matriz o con un revendedor, para iniciar el proceso de recolección y eliminación después de verificar las condiciones contractuales de venta.



Figura 16 Logotipo “WEEE”

Para más información, consulte:

<http://www.agilent.com/environment/product/index.shtml>

Servicio

Si un cliente necesita un servicio de intercambio avanzado o reparación, contacte con un distribuidor local o contacte por correo a:

vpt-customercare@agilent.com

vpl-customercare@agilent.com

Es obligatorio completar la “Request for Return” para devolver su bomba a Agilent para mantenimiento (proporcionada al final del presente manual).

5 使用说明

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关于本手册

有效性

本手册列出 TwisTorr 305 FS Remote Controller 用户说明，特别注意与安全、操作和一级维护有关的注意事项，受用户负责的维护操作限制。

维护操作在特定章节中说明，对于更高等级的维护设有具体规定（接受过维护操作专门培训的人员），用户不得执行此类操作。

有关正确的安装和启动/停止，请参阅“安装”章节。

要正确安装和启动/停止，请参考“Technical Information”章节。

注意

- 1 本手册包含有用信息，确保所有使用 TwisTorr 305 FS Remote Controller 的人员可以安全操作，在设备整个寿命期内发挥完美效率。
- 2 将本手册和所有相关出版物放置在所有操作员、维护人员方便访问的位置。

定义与术语

小心、警告和注意的定义

本手册的一些重要参考内容用背景色突出显示。

小心

程序开始前，提示小心消息，如果不遵守过程指示，可能导致设备损坏。

警告

警告消息提醒操作员注意特定过程或做法，如果执行错误，可能导致人员重伤。



注意

注意旨在让人注意重要信息，提供具体步骤的更多详细信息。

警告符号

以下是在 TwisTorr 305 FS Remote Controller 上与警告一起显示的符号列表。还显示了这些符号所指的危险。

三角形符号表示警告。在文档或仪器警告旁边可能出现的符号含义如下：



表示危险电压



一般危险



欧洲符合性声明



生产现场



CSA 认证



废弃电气和电子设备



RoHS中国认证



UK CA 打标

使用说明

以下符号可用作附在仪器上的警告标签。当您看到此符号时，请参阅相关操作或维修手册，了解该警告标签所指的正确操作过程。



以下符号会出现在仪器上以供您参考。

	一般危险
	表示危险电压
	CE认证
	CSA 认证
	RoHS中国认证
	废弃电气和电子设备
	UK CA 打标

安全

本节包含机械指令 2015/14/EC 规定的信息，这些信息对于遵守常规安全法规以及机器特定用途相关安全法规至关重要。

不遵守这些说明或本手册的其他说明，将导致设计阶段设想的安全条件无效，操作员可能发生事故。

对于不遵守技术文档中的安全规定而导致的机器损坏或者操作员或第三方人身伤害，Agilent Technologies 不承担任何责任。

正确使用

本手册包含机器安全工作需要遵守的重要警告和安全说明。

本手册所述产品仅用于本手册指定的应用领域。手册还规定了产品应用和操作基本要求相关的说明，以及可确保正常运行的安全措施。对于将产品用于非本手册介绍的用途或者产品使用过程中不遵守基本要求和安全措施，Agilent Technologies 不承担责任。

必须由能够采取必要安全措施，不会导致损坏或受伤的具备资质人员使用产品。产品的配套配件和设备必须由 Agilent Technologies 提供或授权使用。

必须由了解相关风险的专业技术人员执行任何调整或维护操作。

必须由 Agilent 授权人员执行产品维修。

使用不当

对于因不正确使用 TwisTorr 305 FS Remote Controller 而造成的任何后果，安捷伦科技公司 (Agilent Technologies) 不承担任何责任。

使用不当将导致所有责任保证和索赔保证失效。使用不当的定义为：

- 使用未指定的安装材料安装设备
- 在冷凝环境中操作
- 在规定范围外的高湿环境中操作
- 在多尘环境中操作
- 在线路电压超出规格的情况下操作
- 在电离辐射区域内操作设备
- 在潜在爆炸区域内操作
- 在类冲击应力和振动或周期性力影响设备的系统中使用设备。

防护装备

由于此设备无需维护，因此不需要任何其他保护设备。

警告

坠落物体造成伤害的风险



手动运输真空控制器时，存在负载滑落和坠落的危险。

- 双手携带控制器。



涡轮分子泵控制器安全指南

用户不应打开以下操作手册中所述的涡轮分子泵控制器，以避免可能损坏内部组件的风险。

警告

为避免损坏设备并防止操作人员受伤，应严格遵守本手册中提供的安装说明！



运输及存储

运输和存储控制器时，应满足以下环境要求：

- 温度：-20 °C 至 +70 °C
- 相对湿度：0 ÷ 95%（无冷凝）。

般信息

本设备供专业人员使用。在操作设备之前，用户应阅读本说明书和安捷伦提供的任何其他信息。安捷伦对因不遵守这些指示、未经培训的人员不当使用、未经授权干扰设备或任何违反特定国家标准规定的行为而发生的任何事件概不负责。

TwisTorr 305 FS 遥控器是微处理器控制的固态变频器，具有自诊断和自我保护功能。

- 控制器功能：
- 前部/远程/串行操作
- 24Vdc 泵风扇冷却驱动器
- 通风阀驱动
- 停止后泵速度读数（停止速度读数）
- 如果连接了 FRG 仪表，则会进行压力读数
- 输入电压自动设置。
- Profibus 接口（可选）

要正确安装和启动/停止，请参考“Technical Information”章节。

安装

安装准备

控制器具有特殊的保护性包装。如果这个包装在运输过程中出现损坏的迹象，请联系当地的销售办事处。打开控制器包装时，请确保不要摔落控制器或使其受到任何形式的撞击。请勿以未经授权的方式处置包装材料。请勿以未经授权的方式处理包装材料。该材料是100%可回收的，符合EEC指令94/62号和随后颁布的修正案。

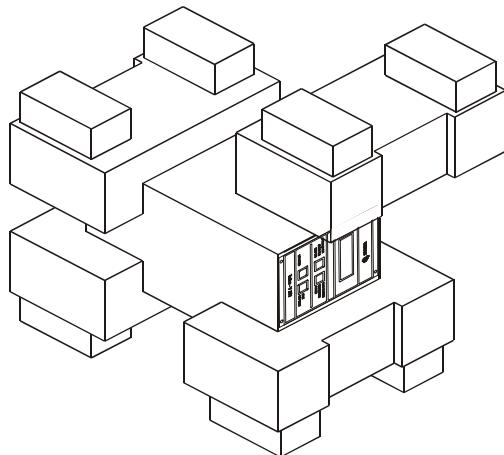


图 17 TwisTorr 305 FS Remote Controller 包装

设置

警告



该控制器仅供室内使用，必须使用 3 线电源线供电（参见可订购部件表）和插头（得到国际认可），以确保用户的安全。将此电源线和插头与正确接地的电源插座一起使用，以避免电击并满足 CE 要求。控制器中产生的高压会导致严重的人身伤害甚至死亡。维修本机之前，请断开输入电源线的连接。

警告



电源线：正确的电线电缆是三芯 (**Ph+N+Earth**) 电缆。

对于等于 **3 m** 的参考电缆长度，在 **240 Vac** 电源电压的情况下，导线截面必须至少为 **1.0 mm²** 或在 **120 Vac** 电源电压的情况下至少为 **2 mm²**。

注意

TwisTorr 305 FS 遥控器可以用作台式装置或机架模块，但必须放置在适当的位置，以使自由的空气可以流过孔。请勿在暴露于大气物质（雨、雪、冰）、灰尘、腐蚀性气体或爆炸性环境或高火灾风险的环境中安装或使用控制器。

在操作过程中，必须遵守以下环境条件：

- 温度：从+5°C至+45°C;
- 相对湿度：0 - 95 % （无冷凝）。

有关上述和其他连接的详细信息以及安装选项的详细信息，请参阅附录“Technical Information”。

TwisTorr 305 FS 遥控器安装

本段描述了基本的操作程序。附录 "Technical Information" 的“使用”段落中提供了涉及可选连接或选件的详细信息和操作过程。

在操作TwisTorr 305 FS 遥控器之前，请进行所有真空歧管和电气连接，并参考 TwisTorr 305 FS 泵说明书。

警告

为避免人员受伤和设备损坏，如果泵放在桌子上，请确保其保持稳定。如果泵入口未连接至系统或堵死，则切勿操作 **TwisTorr 305 FS** 泵。



注意

连接到线路电压后，要以非常简单的方式操作控制器，请在 J1 连接器上连接与控制器一起提供的预接线配对连接器。

预接线的配对连接器是一种允许控制器操作（例如，在前面板上操作）的简单快捷的方法，而无需实施其他有线外部连接，如串行通信或远程输入/输出。

前置泵和 TwisTorr 305 FS 泵可以同时开启。

Controls, Indicators and Connectors

The following paragraph illustrates the Controller control panel and interconnection panel. More details are contained in the appendix "Technical Information".

Front Panel Description

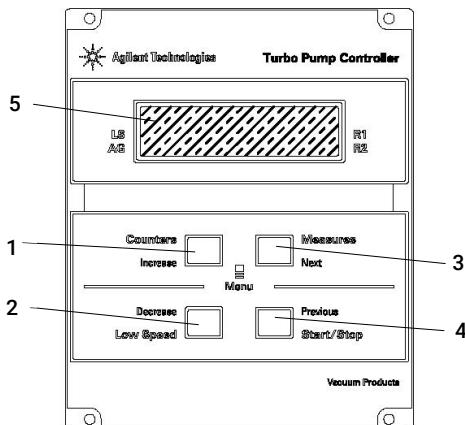


图 18 控制器 TwisTorr 305 FS 远程前面板

-
- 1 键盘按钮可在显示屏上调出循环次数、循环时间和泵寿命。
 - 2 用于选择低速模式的键盘按钮。仅当选择了前面板操作时，它才会处于活动状态。按下一次，泵以“备用”速度运行。要取消选择模式，请再次按下按钮。
 - 3 键盘按钮可调用显示屏上的泵电流、泵温、泵功率和转速。无论选择何种操作模式，它始终处于活动状态。如果将按钮 3 和 1 按下至少 2 秒钟，则可以将控制器置于一个例程中，以便对一些操作参数进行编程。
 - 4 用于选择“开始”、“停止” / “重置”模式的键盘按钮。仅当选择了前面板操作时，它才会处于活动状态。在开始阶段开始后按；如果再次按下，则会停止泵。如果泵因故障自动停止，则必须按下此按钮一次以重置控制器，而后再次按下按钮以重新启动泵。
 - 5 LCD 背光字母数字显示：点阵 2 行 x16 个字符。
-

使用说明

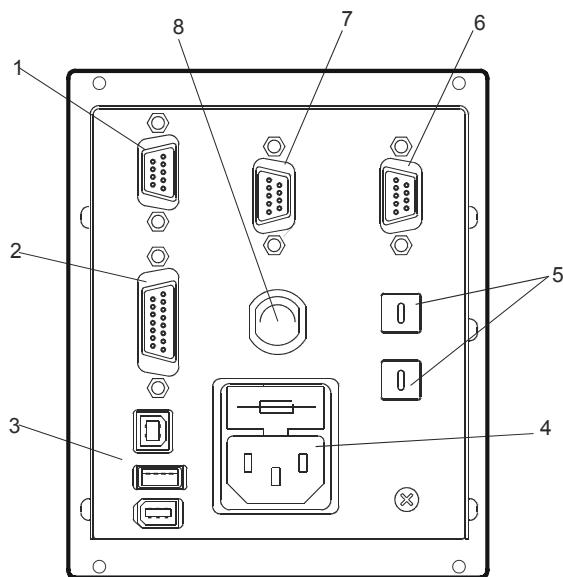


图 19 控制器 TwisTor 305 FS 远程后面板

-
- 1 逻辑输入信号连接器（连接链路提供的配对连接器）。
 - 2 逻辑输出信号连接器和泵频率监视器加上可编程模拟输出。
 - 3 功率输出连接器（24 Vdc 用于泵冷却风扇、排气阀和仪表）。
 - 4 控制器电源输入模块由电源保险丝、电源插座和 EMC 滤波器组成。
 - 5 用于 Profibus 地址设置的旋转开关。
 - 6 Profibus（可选）。
 - 7 远程控制串行连接器。
 - 8 泵电缆（5 米长）。
-

TwisTorr 305 FS Remote Controller 的启动和运行

控制器启动

如要启动控制器，请将电源线与合适的电源连接。

启动泵

如要启动泵，请确认互锁输入，然后按控制器前面板上的“开始”按钮。

Pump Shutdown

停止泵

如要关闭泵，请按控制器前面板上的“停止”按钮。

慢启动

警告



为了确保涡轮泵轴承的正确润滑，在安装后的第一次启动时，控制器会自动设置（并且不能由用户停用）被称为“软启动”的渐进式泵启动斜坡（泵被驱动旋转以获得连续的速度步进）。

成功完成软启动后，后续启动将按照正常模式进行，然后是连续爬升的斜坡（不再是阶梯式）。

如果将新泵与使用过的控制单元一起使用，请记住手动设置慢启动模式。

与标准启动相比，慢启动模式需要更长的时间；用户必须等待泵完全达到转速，然后才能停止泵。

第一次启动后，控制单元不会再次在慢启动模式下启动泵。

用户可以根据需要决定使用“软启动”斜坡来启动泵，根据串行命令（或远程输入）进行操作，就如“技术信息”一章中所述（参考“窗口含义”段落 – 对于串行 – 以及“控制器连接”段落，P1——输入——分别远程输入）。

注意

当软启动模式处于活动状态时（首次启动时由控制器自动启动和用户手动启动），控制器会在显示屏上给出指示：

- “软启动模式”消息
- 一个随着速度步长的变化而变化的条形指示器。

条形指示器会显示在显示屏的右上角（参考箭头 A），此外还有其他已存在的消息也一样。

“软启动模式”的信息与其他信息（参考箭头 B）会交替显示在显示屏上，并持续显示约 3 秒钟。

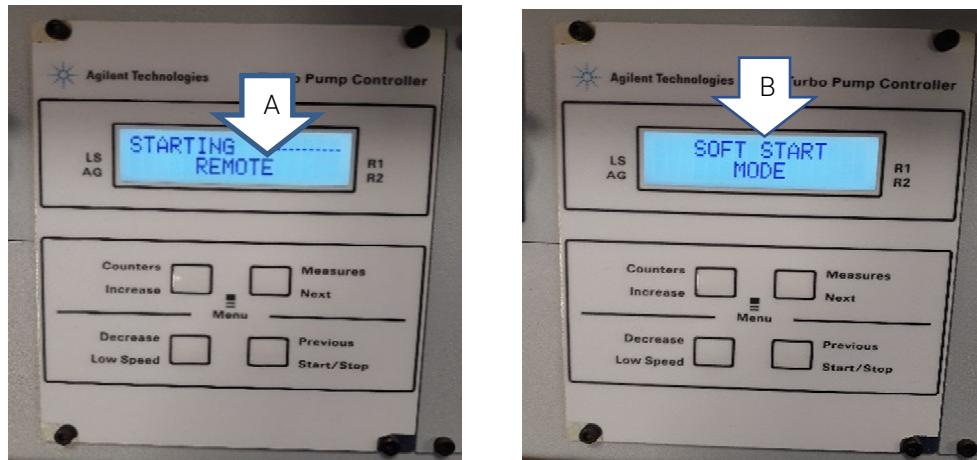
当控制器显示屏不再显示条形指示器或“启动中 (STARTING)”的消息与“软启动模式”的消息交替显示，而当仅显示“正常”的消息时，则软启动 (SOFT START) 已成功完成。

在自动软启动（第一次启动）期间，如果这在完成之前被中断（例如控制器由于网络故障而关闭或向控制器发送“停止 (STOP) 的消息），则在下一次重启时，控制器将自动重新激活软启动斜坡。

使用说明

在软启动期间（无论是自动还是用户设置），直到完成，特定串行窗口（参见“技术信息”一章-窗口含义）指示的状态为“2”，表示“斜坡”。软启动完成后，如果成功执行，则特定串行窗口指示的状态为“5”，表示“正常”。

软启动开始时的显示屏指示：显示器交替地通过条形指示器和“软启动模式”的消息来指示正在启动。



正在进行软启动时显示屏指示：条形指示器随着速度步长的增加而变化。



使用说明

软启动完成时的显示屏指示：“软启动模式”的消息不再出现在显示器上，条形指示器也一样，“启动中”的消息被“正常”消息取代。



注意

长时间不活动（60 天或更长时间）后，为了再次正确重新分配轴承中的润滑脂，有必要通过慢启动模式再次启动泵。

"Technical Information" 部分提供了详细信息。

错误消息

对于特定类型的故障，控制器将自行诊断错误，并显示下表中描述的消息。

表 5 错误消息

消息	描述	修复操作
RUN UP TIME	泵无法在期望值（运行时间，可配置）内达到> 700 Hz 的速度值。	检查运行时间设置：应根据客户流程相应设置。检查泵内流动气体负载并相应地进行调整。检查泵转子是否可以自由旋转。重新启动泵。
CHECK CONNECTION TO PUMP	泵和控制器之间的连接错误。 或 泵的温度低于 0 °C	检查控制器和泵之间的连接。 按下“开始”按钮两次以启动泵。
WAITING INTERLOCK	P1 连接器的互锁信号是通过中断 J1 连接器的引脚 3 和 8 之间的链接来激活的，或者是 因为外部互锁信号已打开。	重置 P1 连接器引脚 3 和引脚 8 之间的短路，或关闭外部互锁信号。
PUMP OVERTEMP.	泵体的温度已超过允许的最大上限，具体取决于所选气体的类型 (Ar : 50°C; N2 : 55°C; He : 60°C)	等待温度降至阈值以下。按下“开始”按钮两次以启动泵。
CONTROLLER OVERTEMP.	控制器环境温度超过 70°C。 或 控制器的散热器温度高于 60°C。	等待温度降至阈值以下。按下“开始”按钮两次以启动泵。
TOO HIGH LOAD	泵抽取的电流高于编程电流。	检查泵转子是否可自由旋转。按下“开始”按钮两次以启动泵。
SHORT CIRCUIT	启动阶段后，输出连接短路。	检查泵和控制器之间的连接和短路。按下“开始”按钮两次以启动泵。

使用说明

表 5 错误消息

SYSTEM OVERRIDE	通过远程触点提供的紧急停止信号来停止泵。	拆下控制器电源线并检查紧急情况。然后重新连接电源线，然后按“开始”按钮两次以启动泵。
OVERRVOLTAGE	控制器电源电路有故障，或控制器收到尖峰信号。	按下“开始”按钮两次以启动泵。如果消息仍然存在，请致电安捷伦服务。
RUN UP TIME	超时	检查运行时间的设置。必须根据客户流程对其进行调整。检查泵内流动的气体负荷量

维护

TwisTorr 305 FS 远程系列控制器不需要任何维护。在控制器上执行的任何工作必须由授权人员执行。

发生故障时，可以使用安捷伦维修服务。通过安捷伦提前更换控制器。

警告

在对控制器执行任何工作之前，请断开控制器与电源的连接。



控制器报废时，必须按照国家具体标准进行处理。

处置

标签中的“WEEE”徽标含义。

按照 EC WEEE（废电子电气设备）指令应用以下符号。

此符号（仅在欧盟国家有效）表示所适用产品不得与家庭或工业垃圾一起处置，必须送至专门废弃物回收系统。因此，欢迎最终用户联系设备供应商（无论是母公司还是零售商），在检查销售合同条款后启动回收和处置流程。



图 20 “WEEE” 徽标

有关更多信息，请参考：

<http://www.agilent.com/environment/product/index.shtml>

服务

如果客户需要高级替换或维修服务，请联系当地经销商或直接发送邮件至

vpt-customercare@agilent.com

vpl-customercare@agilent.com

需要填写 "Request for Return" 表才能将泵退回到 Agilent 维修部门（在本手册末尾会提供）。

6

取扱説明書

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この説明書について

有効期

本説明書には、特に安全、操作手順およびユーザーに必要なメンテナンス手順のみの簡易メンテナンスに関連する考え方を参考に、TwisTorr 305 FS Remote Controller の使用方法をユーザーに説明します。

高度なメンテナンス（メンテナンス手順の個別訓練を受けた人員）に関連した各条項とあわせて、各セクションで説明するメンテナンス手順は、ユーザーは行わないでください。

正しい取り付けと起動/停止については、「取り付け」の章をご確認ください。

正しい取付および始動/停止については、「Technical Information」セクションを参照してください。

注

- 1** 本説明書には、TwisTorr 305 FS Remote Controller を使用する人員がすべて安全に使用でき、また機器使用寿命中に効率よく使用できるのに、役立つ情報が記載されています。
- 2** 本説明書は、関連するすべての刊行物とあわせて、オペレータ/メンテナンス要員に分かりやすい、取り扱いしやすい場所に保管してください。

定義と用語

警告・注意・注の定義

このマニュアルのいくつかの重要な参照部は、対比色でハイライトされ枠で囲っています。

注意

「注意」のメッセージは、もし監視されていない場合に装置に損害が生じる可能性を示しています。

警告



「警告」のメッセージは、もし正しく操作されない場合に、重大な人身障害につながる可能性がある特定の操作や実行への操作者の注意の必要性を示しています。

注

「注」は、重要な情報への注意喚起と特定の工程に関してのより詳細な情報を提供しています。

警告の記号

下記は、TwisTorr 305 FS Remote Controller上の警告と併せて表示される記号のリストです。危険性の説明も記載されています。

三角の記号は警告を示しています。説明書内または装置上の警告記号と共に示される記号の意味は下記の通りです：



危険な電圧



包括的な危険



CE適合宣言書



製造所



CSA 認証



廃電気・電子製品に関するEU WEEE指令



中国RoHS 指令認証



UK CAマーキング

下記の記号は、装置に貼り付けられた警告ラベル上に使用されることがあります。もしこの記号を目視した場合、その警告ラベルに関する正しい工程のためには、関連する操作またはサービスマニュアルを参照してください。



参考情報として、下記の記号は装置上に示されます。

	包括的な危険
	危険な電圧
	CE認証
	CSA 認証
	EU RoHS指令認証
	中国RoHS 指令認証
	廃電気・電子製品に関するEU WEEE指令
	UK CAマーキング

安全性

このセクションは、一般的、かつ機械の特定の使用に関する安全規定の遵守と監督に必須である機械指令（Machinery Directive 2015/14/30 EC）の情報を含みます。

これらの指示とこのマニュアル内のその他の指示に従わなかった場合、設計時に予測された安全状態が非効率に損なわれ、機械を操作する者へ事故が生じる可能性があります。

アジレント・テクノロジー株式会社は、技術的な参考書に示された安全規定の不順守により派生した、機械または操作者もしくは第三者の身体的安全への損害・損傷の責任を全て拒否します。

適切な使用

このマニュアルは、装置一式が安全に機能するために遵守されるべき重要な警告と安全の手引きを含みます。

このマニュアルに説明されている製品は、説明書に特記されている分野への活用に限定した目的のものです。マニュアルはまた、製品の活用と操作に必須の要件に関する指示と標準の操作を保証するために適用される安全対策を提供します。アジレント・テクノロジー株式会社は、このマニュアル内説明されているもの以外の適用、または必須の要件や安全対策に注意が払われていない場合にいかなる保証も提供せず、またはいかなる責任も負いません。

製品は、損傷や怪我を生じさせない状況下において必要な安全対策を講じることができる有資格者のみ使用することができます。製品と共に使用されたいかなる付属品や機器も、アジレント・テクノロジー株式会社により共有もしくは承認されたものでなければなりません。

いかなる調整またはメンテナンスの操作は、リスクについて承知している専門家の技術者により実行されなければいけません。

製品の修理は、専らアジレント・テクノロジー株式会社により行われなければなりません。。

不適切な使用

アジレント・テクノロジー株式会社は、TwisTorr 305 FS Remote Controllerの不適切な使用により派生した全ての責任を拒否します。

不適切な使用は、責任と保証への全ての請求権が喪失します。不適切な使用は下記の通り定義されます：

- 指定されていない取り付け器具を使用した装置の設置
- 凝縮環境での操作
- 指定範囲外の高湿度環境での操作
- ほこりの多い環境での操作
- 仕様外の線間電圧での操作
- 電離放射線がある場所での装置の操作
- 爆発の可能性がある場所での操作
- 衝撃のような圧力や振動、または断続的な力がデバイスに影響を与えるシステム下での装置の使用。

保護装具

この装置にはメンテナンスは想定されていないため、他の保護装具は必要ありません。

警告

落下物による怪我の危険性



真空コントローラーを手で運ぶ際に、荷物が滑って落下する危険性があります。

- コントローラーは両手で持ち運んでください。



ターボ分子ポンプ コントローラーの安全ガイドライン

以下の操作マニュアルに記載されているとおり、ターボ分子ポンプコントローラーは、内部コンポーネントが損傷するリスクを回避するために、使用者は開けないでください。

警告

装置の損傷と操作者の怪我を避けるために、このマニュアルに記載された取り付けの指示に厳密に従ってください！



运输及存储

コントローラーを輸送、保存する時は、下記の環境仕様を超過してはいけません：

- 温度範囲： -20° C から +70° C まで
- 相対湿度範囲： 0 から 95 %まで（結露なし）。

概要情報

この装置は技術者による使用を対象としています。使用者は、この取扱説明書と Agilentにより提供される他の追加情報もあわせて、装置を操作する前に全てお読みください。Agilentは、部分的であってもこれらの取扱説明に従わない場合や、訓練されていない人による不適切な使用、装置への認められていない干渉、または特定の国家規格の規定に相いれないかかる行動によって生じたいかかる事態にも責任を負いません。

TwisTorr 305 FS リモートコントローラーは、マイクロ・プロセッサーにより制御され、ソリッドステートの自己診断機能と自己防護機能がついた周波数変換器です。

コントローラーの特徴：

- フロント / リモート / 直列操作
- 24Vdc ポンプ用ファン冷却ドライブ
- 通気弁ドライブ
- 停止コマンド後のポンプ速度の計測（停止速度の計測）
- FRGゲージが接続されている場合の圧力測定値。
- 入力電力の自動設定
- Profibus インターフェース（オプション）

詳細情報は "Technical Information" セクションに記載されています。

取り付け

取り付けの準備

コントローラーは、特殊な保護梱包で提供されます。もしこの梱包に移送の間に生じた可能性のある破損が見受けられる場合、現地販売事務所に問い合わせてください。コントローラーの梱包を開ける際には、落とさない、またはいかなる形での衝撃を与えないようにしてください。不適切な方法で梱包材料を破棄しないでください。EEC指令94/62とそれに準ずる改正を遵守しています。

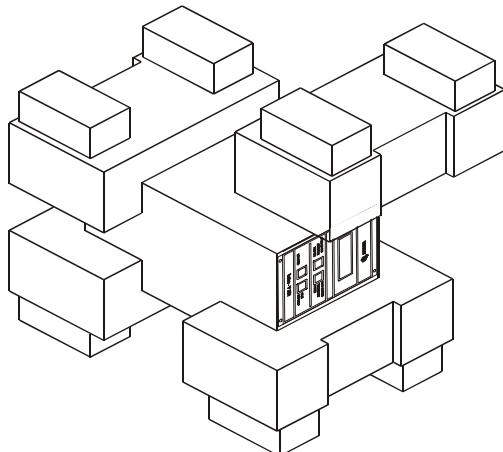


図 21 TwisTorr 305 FS Remote Controller の梱包

取り付け

警告



コントローラーは、屋内ののみの使用が対象で、使用者の安全のために3本のワイヤー電源コード（注文可能な部品を参照）とプラグ（国際的に認可されたもの）で電源が供給されなければいけません。電気ショックを避け、またCE要件を満たすために、この電源コードとプラグを適切に設置された電源ソケットと合わせて使用してください。

コントローラー内で発達した高電圧は、重大な損傷や死亡を引き起こす可能性があります。ユニットを点検する前に、入力電源ケーブルの接続を断ってください。

警告



電源コード：電気配線に適したケーブルは、3線（Ph + N + Earth）ケーブルです。

3 m と同等の長さの標準ケーブルに対して、ワイヤー部分は **240Vac** の供給電圧の場合は 1.0mm^2 以上、**120Vac** の供給電圧の場合は 2 mm^2 ある必要があります。

注

TwisTorr 305 FS リモートコントローラーは、ベンチユニットまたはラックモジュールとして使用できますが、穴を通して自由に通気が取れるように所定の位置に設置されなければいけません。大気物質（雨、氷、雪）、ちり・ホコリ、侵略的ガスなどが露出する環境、または爆発の可能性がある環境、または燃えやすい環境下では、取り付けまたは使用しないでください。

操作中、下記の環境状況は遵守されなければいけません：

- 温度：+5 °C から+45 °C まで；
- 相対湿度：0 - 95 % （結露なし）

上記およびその他の接続、およびオプションのインストールに関する詳細情報については、“Technical Information” のセクションを参照してください。

TwisTorr 305 FS リモートコントローラー取り付け金具

この段落では、基本的な操作手順について説明します。

オプションのアクセサリの取り付けについては、"Technical Information" を参照してください。

コントローラを使用する前に、すべての電気および空気圧の接続を行い、TwisTorr 305FSポンプの取扱説明書を参照してください。

警告



人体への損傷や装置への損害を避けるために、もしポンプがテーブルの上に置かれている場合には安定していることを確かめてください。もしポンプ吸入口がシステムに接続されていない、または抜け落ちている場合は、**TwisTorr 305 FS** ポンプを決して操作しないでください。

注

線間電圧に接続したら、非常に簡単な方法でコントローラーを操作するには、コントローラーに付属している配線済みの相手側コネクタを J1 コネクタに接続します。

配線済みの相手側コネクタは、シリアルコムやリモート I/O などの他の配線された外部接続を行う必要なく、コントローラを操作（たとえば、フロントパネルで動作）できるようにする簡単で迅速な方法です。

フォアポンプと TwisTorr305FS ポンプを同時にオンにすることができます

コントロール、指示器、コネクター

次の段落は、コントローラーのコントロールパネルと相互接続パネルを示しています。詳細については、付録 "Technical Information" を参照してください。

フロントパネル説明

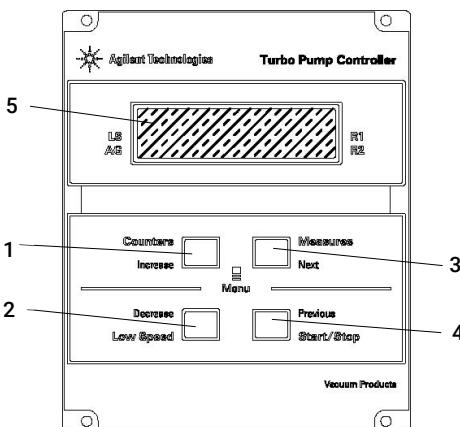


図 22 コントローラー TwisTorr 305 FS リモートフロントパネル

-
- 1 サイクル数、サイクル時間、ポンプの寿命をディスプレイ上に表示させるキーボードプッシュボタン。
 - 2 低速モードの選択用キーボードプッシュボタン。フロントパネル操作が選択された時のみアクティブになります。1回押すとポンプは「待機」速度で作動します。モードの選択を解除するには、プッシュボタンを再度押してください。
 - 3 ポンプの電流、ポンプの温度、ポンプの電源と回転速度をディスプレイ上に表示させるキーボードプッシュボタン。選択された操作モードに関わらず、これは常にアクティブです。プッシュボタン 3 と 1 は、最低でも 2 秒間一緒に押された場合に、コントローラーはいくつかの操作パラメーターをプログラム可能なルーチン下におかれます。
 - 4 「開始、停止/リセット」モードの選択用キーボードプッシュボタン。フロントパネル操作が選択された場合のみアクティブになります。1回押すと起動フェーズが開始します；もし再度押すとポンプを停止します。もしポンプが障害・故障により自動的に停止された場合、コントローラーをリセットするには1回、ポンプをリストアートするには2回このプッシュボタンを押してください。
 - 5 LCD バックライトの英数字ディスプレイ：ドットマトリックス 2 列 × 16 文字。
-

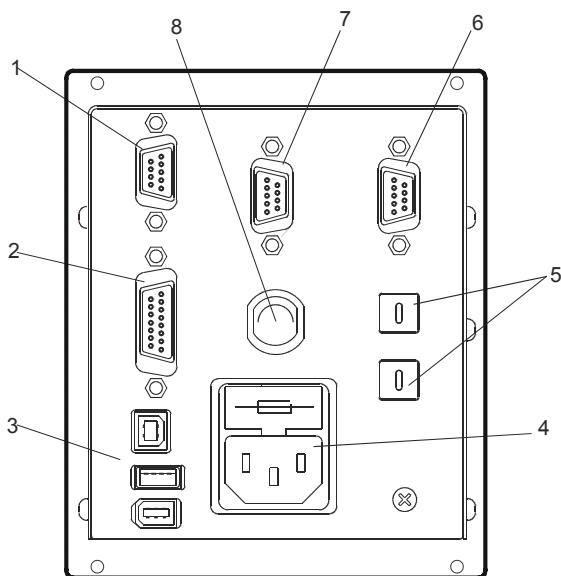


図 23 コントローラーTwisTorr 305 FS リモートリアパネル

-
- 1 ロジック入力信号コネクター（リンクと共に供給される組み合わせコネクター）。
 - 2 ロジック出力信号コネクターとポンプ周波数モニター、またプログラム可能なアナログ出力。
 - 3 電力出力コネクター（ポンプ冷却ファン、通気弁と計器用の 24 Vdc）。
 - 4 主要ヒューズ、主要ソケットと EMC フィルターから構成されるコントローラー電力エントリーモジュール。
 - 5 Profibus のアドレス設定用回転スイッチ。
 - 6 Profibus（オプション）。
 - 7 リモートコントロールシリアルコネクター。
 - 8 ポンプケーブル（長さ 5m）。
-

TwisTorr 305 FS Remote Controller コンパクトの起動と操作

コントローラーの起動

コントローラーを起動するには、電源ケーブルを適切な電源プラグに接続してください。

ポンプの開始

ポンプを開始するには、インターロック入力を確認して、コントローラーフロントパネル上の「開始」のプッシュボタンを押してください。

ポンプの停止 Pump Shutdown

ポンプを停止するには、コントローラーフロントパネル上の「停止」のプッシュボタンを押してください。

ソフトスタート

警告



ターボポンプペアリングの適正な潤滑を確保するために、取り付け後の最初の始動時に、コントローラーは「ソフトスタート」(ポンプは連続した段階速度で回転駆動します)と呼ばれる段階的なポンプポートのランプを自動的に設定します(ユーザーが非アクティブにすることはできません)。ソフトスタートが正常に完了すると、後続のスタートは通常モードに従って行われ、その後、継続的な上昇のランプが続きます(段階的ではなくなります)。

使用済みのコントロールユニットで新しいポンプを使用する場合には、手動でソフトスタートモードを設定することを忘れないでください。

ソフトスタートモードは、標準の起動開始よりも時間がかかります；使用者は、ポンプを停止する前にはポンプが最大速度になるまで待たなければなりません。

初回の開始後は、ポンプは再度コントロールユニットによるソフトスタートモードにはなりません。

「技術情報」の章で詳しく説明されているように、ユーザーは、必要に応じてソフトスタートランプを使用してポンプを始動することも選べます。(シリアルに関するウィンドウの意味の段落、リモート入力に関してはコントローラー接続の段落P1「入力」をそれぞれ参照してください)。

注

ソフトスタートモードがアクティブな場合(最初の起動時にコントローラーによって自動的に開始された場合と、ユーザーにより手動でアクティブにされた場合の両方)、コントローラーはディスプレイに以下が表示されます:

- 「ソフトスタートモード」のメッセージ
- 速度ステップの進行に応じて進化するバーインジケーター。

バーインジケーターは、ディスプレイの右上隅に表示され(矢印Aを参照)、同じ場所にすでに存在する他のメッセージに加えて同時に表示されます。

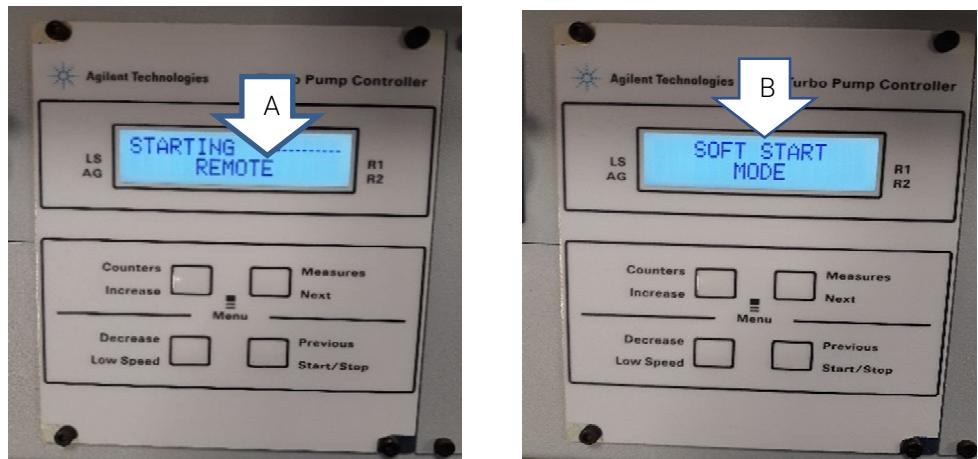
「ソフトスタートモード」というメッセージは、他のメッセージと交互にディスプレイに表示され(矢印Bを参照)、約3秒間永続的に表示されたままになります。

コントローラーディスプレイにバーインジケーターが表示されない、または「始動中」メッセージと「ソフトスタートモード」のメッセージが交互に表示されなくなり、「正常」のメッセージのみが表示された場合、「ソフトスタート」は正常に完了しています。自動ソフトスタート中に(最初の始動時)、これが完了する前に中断する必要がある場合(たとえば、ネットワーク障害のためにコントローラーがシャットダウンしたり、コントローラーに「停止」のメッセージが送信された場合)、次回の再始動時にコントローラーはソフトスタートランプを自動的に再アクティビ化します。

ソフトスタート中（自動または使用者により設定された場合）、また完了するまで、特定のシリアルウィンドウで表示される状態は「2」で、「ランプ」を意味します（「技術情報」の章の「ウィンドウの意味」の段落を参照）。

ソフトスタートが完了すると、正常に実行された場合、特定のシリアルウィンドウに表示される状態は「5」で「正常」を意味します。

ソフトスタート開始時のディスプレイ表示：ディスプレイには、バーインジケータで「始動中」と「ソフトスタートモード」というメッセージが交互に表示されます。



ソフトスタートが進行中のディスプレイ表示：速度段階が増加するにつれて、バーインジケーターが進行します。



取扱説明書

ソフトスタートが完了した時のディスプレイ表示：「ソフトスタートモード」のメッセージがディスプレイに表示されなくなり、バーインジケーターも表示されなくなります。「始動中」のメッセージは「正常」のメッセージに置き換えられます。



注

長期間の不稼働状態（60日間またはそれ以上）の後、軸受に残存している潤滑油の適切な再分配を可能するには、再度ソフトスタートモードでポンプを開始する必要があります。

詳細情報は "Technical Information" セクションに記載されています。

エラーメッセージ

あるタイプの機能不全に対し、コントローラーはエラーを自己診断し、下記に説明されるメッセージが表示されます。

タブ 6 エラーメッセージ

メッセージ	説明	修理動作
RUN UP TIME	ポンプは、期待値内で>700 Hz の速度値に達することができませんでした（起動時間は設定可能です）。	起動時間の設定の確認：カスタマー手順に従って設定することが推奨されます。ポンプ内に流入されるガス量を確認し、それに従って調節してください。 ポンプのローターが障害なく回転できるか確認してください。 ポンプをリスタートしてください。
CHECK CONNECTION TO PUMP	ポンプとコントローラー間の誤った接続。 または ポンプの温度が 0° C 以下。	コントローラーとポンプ間の接続を確認してください。 ポンプを開始するには、「開始」のプッシュボタンを 2 回押してください。
WAITING INTERLOCK	P1 コネクターのインターロック信号は、J1 コネクターのピン 3 と 8 の間のリンクの中止により、もしくは外部のインターロック信号が開いていることによりアクティベートされます。	J1 コネクターのピン 3 と 8 の間の短絡をリセットするか、または外部のインターロック信号を閉じてください。
PUMP OVERTEMP.	選択されたガスのタイプによりますが、ポンプ本体の温度が許容される最大温度を超えてています。 (Ar: 50°C; N2: 55°C; He: 60°C)	温度が閾値以下になるまでお待ちください。 ポンプを開始するには、「開始」のプッシュボタンを 2 回押してください。
CONTROLLER OVERTEMP.	コントローラーの環境温度が 70° C を超えています。 または コントローラーのラジエーター温度が 60° C 以上です。	温度が閾値以下になるまでお待ちください。 ポンプを開始するには、「開始」のプッシュボタンを 2 回押してください。
TOO HIGH LOAD	ポンプにより引き出された電流量がプログラミングされたものよりも高くなっています。	ポンプのローターが障害なく回転できるか確認してください。ポンプを開始するには、「開始」のプッシュボタンを 2 回押してください。

タブ 6 エラーメッセージ

SHORT CIRCUIT	起動フェーズの後、出力接続がショートしました。	接続を確認してください。
SYSTEM OVERRIDE	ポンプは、リモートコンタクト経由で提供された緊急停止信号により停止されました。	コントローラーの電源ケーブルを抜き、緊急状態を確認してください。それから電源ケーブルを再接続し、ポンプを開始するには、「開始」のプッシュボタンを2回押してください。
OVERRVOLTAGE	コントローラーの電源供給回路が故障しているか、またはコントローラーがスパイクを受けました。	ポンプを開始するには、「開始」のプッシュボタンを2回押してください。 もしメッセージが消えない場合、Agilentに問い合わせてください。
RUN UP TIME	起動時間切れ	起動時間の設定の確認。カスタマー手順に従って調整してください。ポンプ内に流入されるガス量を確認してください。

メンテナンス

TwisTorr 305 FS リモートシリーズコントローラーは、いかなるメンテナンスも必要としません。コントローラーになされるいかなる作業も、認可された者により遂行されなければなりません。

障害・故障が起こった際には、Agilentの修理サービスを利用することもできます。コントローラーの代替品は、Agilentを通したアドバンスエクスチェンジのサービスを基に利用可能です。

警告

コントローラー上にいかなる作業を遂行する前に、供給源から接続を断つてください。



コントローラを廃棄する場合は、特定の国内基準に従って廃棄する必要があります。

処分

ラベルに記載の “WEEE” ロゴの意味。

下記の記号は、EC WEEE（電気電子機器廃棄物）指令にしたがって適用されます。

この記号 (EC 諸国内のみで有効) は、この記号が適用される製品は、通常の家庭ゴミとあわせて処分してはいけないこと、また個別廃棄物回収システムに送付しなければならないことを表します。そのため、エンドユーザーは、親会社か小売業者かに関係なく、当該機器のサプライヤに連絡の上、契約上の販売条件の確認後、回収および処分プロセスを開始することが求められます。



図 24 ロゴ “WEEE”

詳細は、下記サイトを参照してください。

<http://www.agilent.com/environment/product/index.shtml>

サービス

お客様が最新交換サービスまたは修理サービスが必要な場合は、現地代理店もしくは下記まで直接ご連絡ください：

vpt-customercare@agilent.com

vpl-customercare@agilent.com

“Request for Return”的申請の完了には、サービス提供のためにお客様のポンプを Agilentへ返送する必要があります。（このマニュアルの最後に提供されています）。

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About this manual

Validity

This manual lists the instructions for the users of the TwisTorr 305 FS Remote Controller, with particular reference to the notions relating to safety, operation and first level maintenance, limited to maintenance operations for which the user is responsible.

The maintenance operations, illustrated in the specific sections, with specific provisions relating to the higher level of maintenance (personnel specifically trained for maintenance operations) must not be carried out by the user.

For a correct installation and start/stop, please refer to "Installation" paragraph.

For a correct installation and start/stop, please refer to " Technical Information " section.

NOTE

- 1** This manual contains useful information so that all personnel using the TwisTorr 305 FS Remote Controller can operate it safely and guarantee perfect efficiency, for its entire life span.
 - 2** Keep this manual, together with all the related publications, in an accessible place known to all operators/maintenance personnel.
-

Definitions and terminology

Definition of Caution, Warning and Note

Some important references of this manual are highlighted and framed in contrasting color.

CAUTION

Caution messages are displayed before procedures which, if not observed, could cause damage to the equipment.

WARNING



Warning messages draw the operator's attention to a specific procedure or practice which, if not performed correctly, could result in serious personal injury.

NOTE

Notes are intended to call attention to important information and provide more detail regarding specific steps.

Warning Symbols

The following is a list of symbols that appear in conjunction with warnings on the TwisTorr 305 FS Remote Controller. The hazard they describe is also shown.

A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation are as follows:



Dangerous voltages



Generic hazard



European Declaration
of Conformity



Manufacturing Site



CSA certification



Waste Electrical and
Electronic Equipment



RoHS China certification



UK CA Marking

Instructions for Use

The following symbol may be used on warning labels attached to the instrument. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.



The following symbols appear on the instrument for your information.

	Generic hazard
	Dangerous voltages
	CE certification
	CSA certification
	RoHS China certification
	Waste Electrical and Electronic Equipment
	UK CA Marking

Safety

This section contains the information, prescribed by the Low voltage Directive 2015/14/30 EC, which is essential for the compliance and observance of the safety regulations both generally and in relation to the specific use of the product.

Failure to comply with these instructions and the other instructions contained in this manual may render the safety conditions envisaged in the design phase inefficient and cause accidents to those operating the product.

Agilent Technologies declines all responsibility for damage to the product or for the physical safety of the operator or third parties deriving from the non-observance of the safety rules indicated in the technical documentation.

Proper use

This manual contains important warnings and safety instructions to be observed in order for the unit to work safely.

The product described in this manual is intended exclusively for the area of application specified in the instructions. The manual also provides indications regarding the essential requirements for the application and operation of the product as well as the safety measures that can be adopted to guarantee regular operation. Agilent Technologies does not provide any guarantee or assume any responsibility for applications other than those described in this manual or in which the essential requirements and safety measures are not respected.

The product must only be used by qualified personnel who are able to take the necessary safety measures under conditions that do not cause damage or injury. Any accessories and equipment used with the product must be supplied or approved by Agilent Technologies.

Any adjustment or maintenance operation must be performed by a professional technician informed about the risks.

Repairs on the product must be carried out exclusively by Agilent authorized personnel.

Instructions for Use

Improper use

Agilent Technologies declines all responsibility, deriving from the improper use of the TwisTorr 305 FS Remote Controller.

Improper use will cause all claims for liability and warranties to be forfeited.

Improper use is defined as:

- installation of the device with unspecified mounting material
- operation in condensing environment
- operation in high humidity environment out of the specified range
- operation in dusty environment
- operation with line voltages out of specifications
- operation of the device in areas with ionizing radiation
- operation in potentially explosive areas
- use of the device in systems in which impact-like stress and vibrations or periodic forces affect the device.

Protective equipment

As no maintenance is foreseen for this device, any other protective equipment is not needed.

WARNING

Risk of injury through falling objects



When transporting vacuum controllers by hand, there is a danger through loads slipping and falling down.

- Carry controllers two-handed.

Safety guideline for Turbomolecular Pump Controllers

Turbomolecular pump controllers as described in the following operating manual should not be opened by the user to avoid the risk of damaging internal components.

WARNING



To avoid damage to equipment and to prevent injuries to operating personnel the installation instructions as given in this manual should be strictly followed!

Transport & Storage

When transporting and storing the controllers, the following environmental requirements should be satisfied:

- temperature range: -20 °C to +70 °C
- relative humidity range: 0 to 95 % (non condensing).

Product description

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorised interference with the equipment or any action contrary to that provided for by specific national standards.

The TwisTorr 305 FS Remote Controllers are micro-processor-controlled, solid-state, frequency converter with self-diagnostic and self-protection features.

Controller features:

- Front / Remote / Serial Operation
- 24Vdc pump fan cooling drive
- Vent valve drive
- Pump speed reading after stop command (stop speed reading)
- Pressure reading if the FRG gauge is connected
- Input voltage auto setting.
- Profibus interface (optional).

Detailed information is supplied in the "Technical Information" section.

Installation

Preparation for installation

The controller is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office. When unpacking the controller ensure that it is not dropped or subjected to any form of impact. Do not dispose of the packing materials in an unauthorized manner. The material is 100 % recyclable and complies with EEC Directive with EEC Directive 94/62 and subsequent amendments.

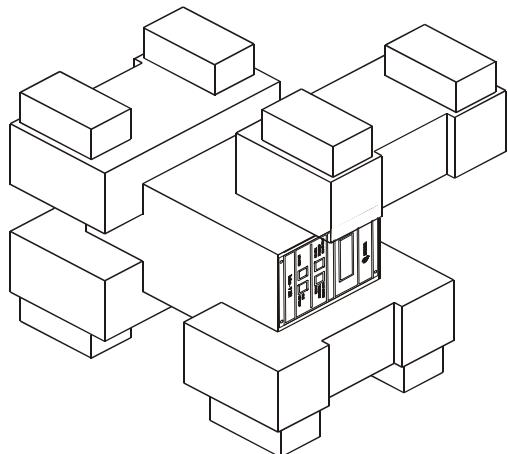


Figure 25 TwisTorr 305 FS Remote Controller packaging

Set-up

WARNING



The controller is designed for indoor use only and must be powered with 3-wire power cord (see orderable parts table) and plug (internationally approved) for user's safety. Use this power cord and plug in conjunction with a properly grounded power socket to avoid electrical shock and to satisfy CE requirements. High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.

WARNING



Power supply cord: the correct cable for electrical wiring is a three wires (Ph+N+Earth) cable.

The wire section has to be at least 1.0 mm² in case of 240 Vac supply voltage or 2 mm² in case of 120 Vac supply voltage for a reference cable length equal to 3 m.

NOTE

TwisTorr 305 FS Remote Controller can be used as a bench unit or a rack module, but it must be positioned so that free air can flow through the holes. Do not install or use the controller in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk.

During operation, the following environmental conditions must be respected:

- temperature: from +5 °C to +45 °C
- relative humidity: 0 – 95 % (non-condensing).

See the appendix "Technical Information" for detailed information about the above mentioned and the other connections, and about the options installation.

TwisTorr 305 FS Remote Controller Mounting

This paragraph describes the fundamental operating procedures.

For installation of optional accessories, see "Technical Information".

Before using the controller make all electrical and pneumatic connections and refer to TwisTorr 305 FS pump instruction manual.

WARNING



To avoid injury to personnel and damage to the equipment, if the pump is laying on a table make sure it is steady. Never operate the TwisTorr 305 FS pump if the pump inlet is not connected to the system or blanked off.

NOTE

Once connected to the line voltage, to operate the controller in a very simple way, connect on the J1 connector the pre-wired mating connector that is supplied together with the controller.

The pre-wired mating connector is a simple and quick way to allow the controller to be operated (for instance, acting on the front panel), without having the need to implement other wired external connections like Serial Com or Remote I/O.

The forepump and TwisTorr 305 FS pump can be switched on at the same time.

Controls, Indicators and Connectors

The following paragraph illustrates the Controller control panel and interconnection panel. More details are contained in the appendix "Technical Information".

Front Panel Description

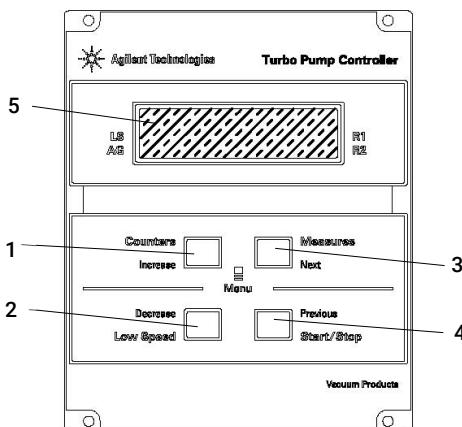


Figure 26 Controller TwisTorr 305 FS Remote Front Panel

-
- 1 Keyboard push-button to recall on the display the cycle number, cycle time and pump life.
 - 2 Keyboard push-button for LOW SPEED mode selection. It is active only when the front panel operation has been selected. Pressed once, the pump runs at "stand-by" speed. To unselect the mode, press the push-button again.
 - 3 Keyboard push-button to recall on the display the pump current, pump temperature, pump power and rotational speed. It is always active regardless of the operating mode selected. Push-buttons 3 and 1, if pressed together for at least 2 seconds, put the controller in a routine where it is possible to program some operation parameters.
 - 4 Keyboard push-button for START, STOP/RESET mode selection. It is active only when the front panel operation has been selected. By pressing once the starting phase begins; if pressed again it stops the pump. If the pump has been stopped automatically by a fault, this push-button must be pressed once to reset the controller and a second time to restart the pump.
 - 5 LCD back-lighted alphanumeric display: dot matrix 2 lines x 16 characters.
-

Instructions for Use

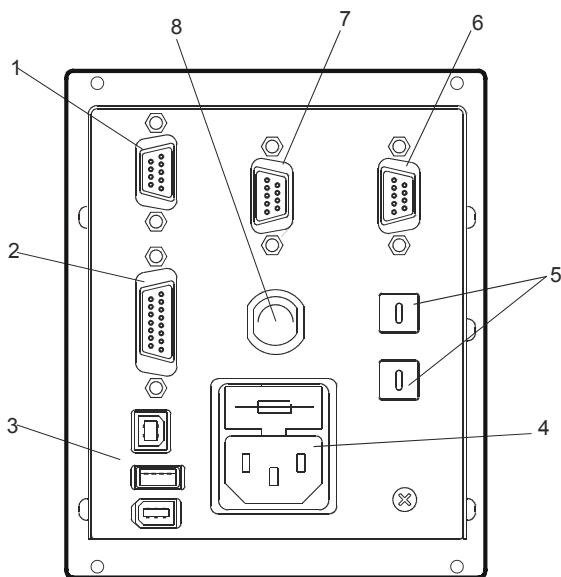


Figure 27 Controller TwisTorr 305 FS Remote Rear Panel

-
- 1 Logic input signals connectors (mating connector supplied with link).
 - 2 Logic output signals connector and pump frequency monitor plus programmable analog output.
 - 3 Power output connector (24 Vdc for pump cooling fan, Vent Valve and Gauge).
 - 4 Controller power entry module consisting of mains fuses, mains socket and EMC filter.
 - 5 Rotary switches for Profibus address setting.
 - 6 Profibus (Optional).
 - 7 Remote control serial connector.
 - 8 Pump cable (5m long).
-

Startup and Operation of the TwisTorr 305 FS Remote Controller

Controller Startup

To startup the controller plug the power cable into a suitable power source.

Starting the Pump

To start the pump, confirm the interlock input and press the START pushbutton on the controller front panel.

Pump Shutdown

To shutdown the pump press the STOP push-button on the controller front panel.

Soft Start

WARNING



To ensure the correct lubrication of the turbo pump bearings, at the first start after installation, the controller automatically sets (and cannot be deactivated by the user) a ramp of gradual pump boot called "Soft Start" (the pump is driven in rotation for successive speed steps).

Once the Soft Start has been successfully completed, the subsequent starts will take place according to the normal mode then with a ramp of continuous climb (and no longer in steps).

In case of use of a new pump with an used control unit, remember to set manually the soft start mode.

The soft start mode will take a longer time compared to the standard start-up; the user must wait that the pump is completely up to speed before stopping the pump.

After the first start, the pump won't be started in soft start mode again by the control unit.

The user can decide to start the pump using the Soft Start ramp as needed, acting on the serial command (or on the remote input), as detailed in the chapter "Technical Information" (ref. to Window Meanings paragraphs - for serial - and Controller Connection paragraph, P1 - Input - for remote input respectively).

NOTE

When the Soft Start mode is active (both when it has been started automatically by the controller at the first start and when it has been manually activated by the user), the controller gives indication showing on the display:

- the "SOFT START MODE" message.
- a bar indicator that evolves in correspondence with the evolution of the speed steps.

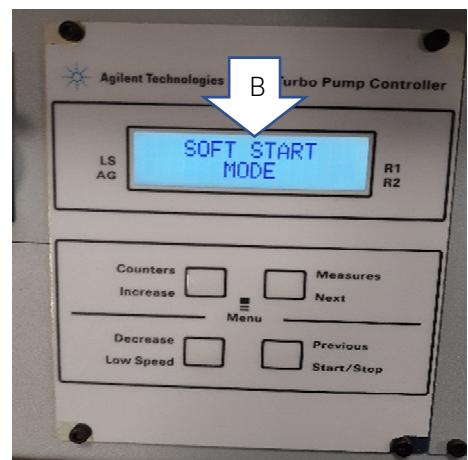
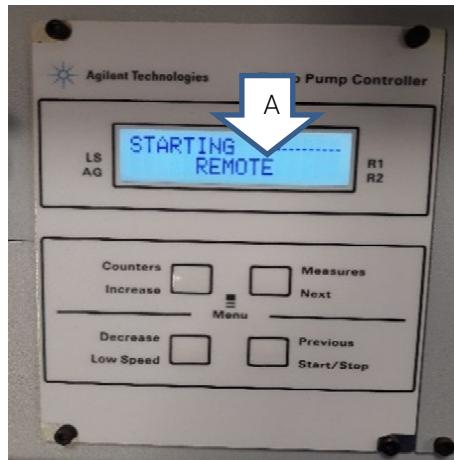
The bar indicator is displayed in the upper right corner of the display (ref arrow A) in addition to and simultaneously with the other messages already present on the same. The message "SOFT START MODE" is showed on the display alternately with other messages (ref arrow B) and remains permanently displayed for about 3 seconds. When the controller display no longer shows either the bar indicator or the STARTING message alternately with the SOFT START MODE message, but displays only the NORMAL message, then the SOFT START has been successfully completed.

During automatic soft start (first start), if this should be interrupted before it is completed (for example the controller shuts down due to network failure or a STOP message is sent to the controller), at the next restart the controller will reactivate the soft start ramp automatically.

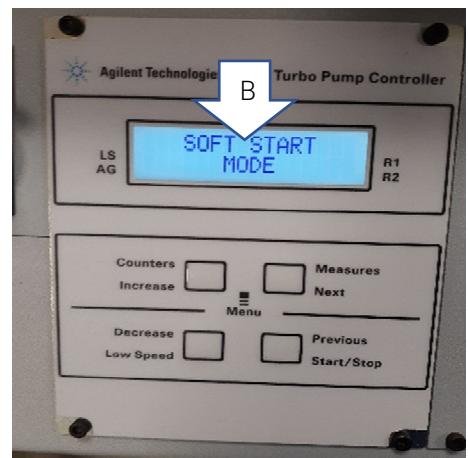
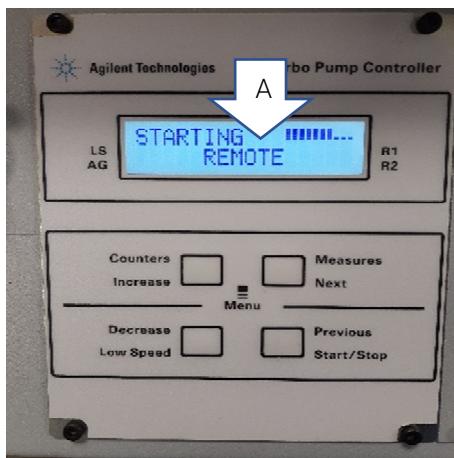
Instructions for Use

During the Soft Start (whether automatic or set by user), and until it is completed, the status indicated by the specific serial window (refer to the chapter "Technical Information", paragraph Window Meanings) is "2" which indicates "Ramp". Upon completion of the Soft Start, if successfully executed, the state indicated by the specific serial window is "5" indicating "NORMAL".

Display indications at the beginning of Soft Start: the display alternatively indicates STARTING with the bar indicator and the message "SOFT START MODE".



Display indications with Soft Start in progress: bar indicator evolves as speed steps increase.



Instructions for Use

Display indications with Soft Start completed: the SOFT START MODE message no longer appears on the display, the bar indicator either, the STARTING message is replaced by the NORMAL message.



NOTE

After 60 days or more of inactivity, in order to allow again the correct redistribution of the grease present in the bearings, it is necessary to start the pump via soft start mode again.

Detailed information is supplied in the "Technical Information" section.

Troubleshooting

For a certain type of failure, the controller will self-diagnose the error and the messages described in the following table are displayed.

Table 7 Error Messages

Message	Description	Repair Action
RUN UP TIME	The pump has not been able to reach a speed value >700 Hz, within the expected value (Run Up Time, which is configurable).	Check for the Run UP Time set-up: it should be set accordingly to the customer process. Check for the gas load flowing inside the pump and adjust it accordingly.
CHECK CONNECTION TO PUMP	Wrong connection between the pump and the controller. Or The pump's temperature is below 0 °C.	Check connection between controller and pump. Press the START push-button twice to start the pump.
WAITING INTERLOCK	The interlock signal of P1 connector is activated by an interruption of the link between pin 3 and 8 of J1 connector, or because the external interlock signal is open.	Reset the short circuit between pin 3 and pin 8 of P1 connector, or close the external interlock signal.
PUMP OVERTEMP.	The temperature of the pump body has exceeded the maximum upper limit allowed, dependent on the type of gas selected (Ar: 50°C; N2: 55°C; He: 60°C).	Wait until the temperature decrease below threshold value. Press the START push-button twice to start the pump.
CONTROLLER OVERTEMP.	The controller environment temperature exceeds 70 °C. Or The controller's radiator temperature is above 60 °C.	Wait until the temperature decrease below threshold value. Press the START push-button twice to start the pump.
TOO HIGH LOAD	The current drawn by the pump is higher than programmed.	Check that the pump rotor is free to rotate. Press the START push-button twice to start the pump.
SHORT CIRCUIT	After the starting phase the output connection is shorted.	Check connections and shortages between pump and controller. Press the START push-button twice to start the pump.

Instructions for Use

Table 7 Error Messages

SYSTEM OVERRIDE	The pump is stopped by an emergency stop signal provided via a remote contact.	Remove the controller power cable and check the emergency condition. Then reconnect the power cable and press the START push-button twice to start the pump.
OVERTVOLTAGE	Controller power supply circuitry is faulty, or the Controller received a spike.	Press the START push-button twice to start the pump. Should the message still be present, call the Agilent service.
RUN UP TIME	Run Up Time out.	Check for the Run Up Time set-up. It has to be adjusted accordingly to the customer process. Check the amount of the gas load which is flowing inside the pump.

Maintenance

The TwisTorr 305 FS Remote series controller does not require any maintenance. Any work performed on the controller must be carried out by authorized personnel.

When a fault has occurred it is possible to use the Agilent repair service. Replacement controllers are available on an advance exchange basis through Agilent.

WARNING



Before carrying out any work on the controller, disconnect it from the supply.

If a controller is to be scrapped, it must be disposed off in accordance with the specific national standards.

Disposal

Meaning of the "WEEE" logo found in labels.

The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.

This symbol (valid only in countries of the European Community) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system. The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.



Figure 28 Logo "WEEE"

For more information refer to:

<http://www.agilent.com/environment/product/index.shtml>

Service

Should a customer need an advanced exchange or repair service, please contact local distributor or directly mail to

vpt-customercare@agilent.com

vpl-customercare@agilent.com

Completion of the "Request for Return" form is required to return your pump to Agilent for service (provided at the end of this manual).

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Description of the TwisTorr 305 FS Remote Controller

The controller is available in two models (see orderable parts table):

- with RS 232-485 option
- with Profibus option

The controller is a solid-state frequency converter with the following features:

- Drives the pumps of the TwisTorr 305 FS family.
- Powers the pump cooling fan.
- Drives the vent valve.
- Provides and acquires the pressure of the wide range gauge.
- Remote I/O is compatible with the previous version (ref. TwisTorr 305 FS Remote Controller). Serial protocol is in most of the cases compatible with the previous version (ref. TwisTorr 305 FS Remote Controller) but, due to the additional features that have been implemented on this unit, some serial windows have been revised in the data format/content.

Please check the chapter "Windows Meanings" in order to get further details about the serial windows specifications.

- Navigator default serial compatible with the previous RS 232 and 485 version.
- Speed reading after stop command.

The TwisTorr 305 FS remote controller models are:

Code	Model
X3506-64130	Twistorr 305 FS AG Remote RS232/485
X3506-64131	Twistorr 305 FS AG Remote Profibus

NOTE

This user manual is also applicable to other 305 Remote controller P/Ns different from standard.

Technical Information

See the following diagram for the connections and orderable parts.

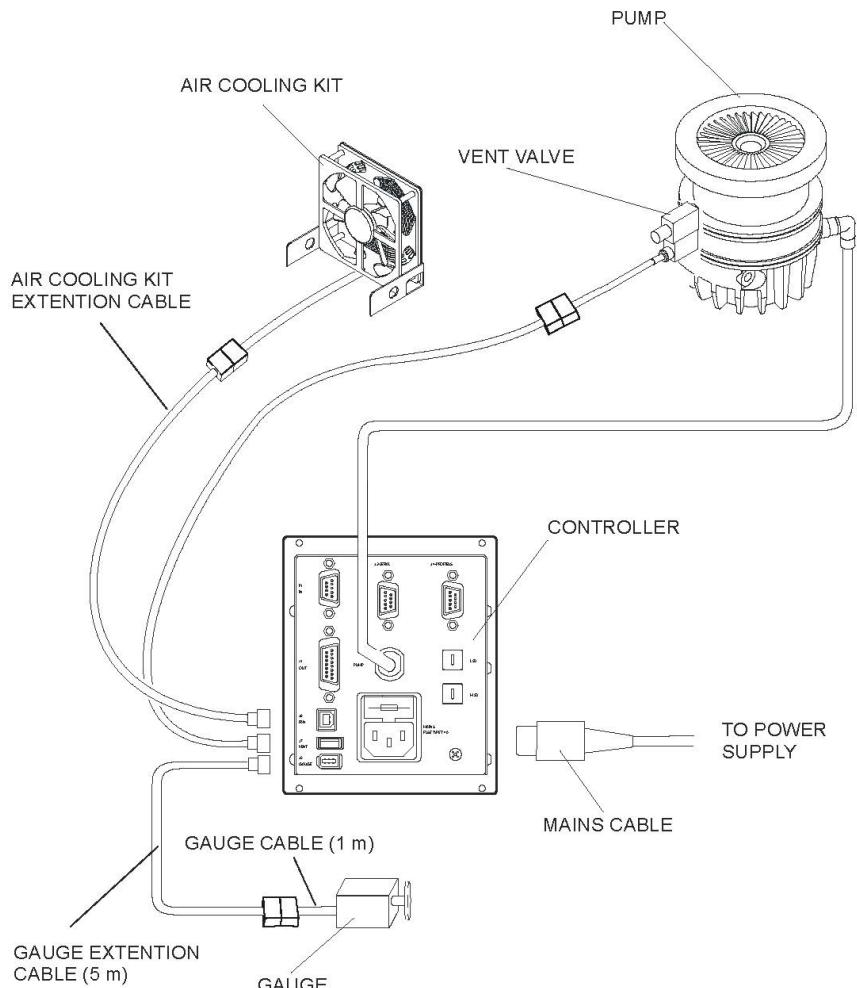


Figure 29 TwisTorr 305 FS Remote Controller – Connections

Technical specification

The following tables list the main technical data of the TwisTorr 305 FS Remote Controller.

Table 8 TwisTorr 305 FS Remote Controller Technical Specification

TwisTorr 305 FS Remote Controller Technical data	
Input:	
Voltage	100, 240 Vac (voltage fluctuation +/- 10%)
Frequency	50 to 60 Hz
Power	450 VA
Fuse	2 x T4 A (slow blow) 250 V
Output:	
Voltage	75 Vac
Frequency	1010 Hz
Power	150 W
Environment storage	-20°C ÷ +70°C 0 ÷ 95% non condensing
Operating	+5°C ÷ +45°C 0 ÷ 90%
Applied norr.	EN 61010 -1 EN 61326-1 EN 50581 EMC Directive 2014/30/EU RoHS Directive 2011/65/EU
Weight:	1.7 Kg (3.2 lbs)
Pollution Degree	2
Installation Category	II
Acoustic noise (ISO7779)	LpA < 70 dB(A), normal operation, operator position

NOTE

The Controller must be positioned in a way that the mains cable can be easily disconnected from the controller mains power inlet (the controller is not equipped with a mains switch).

Controller Outline

The outline dimensions for the TwisTorr 305 FS Remote Controllers are shown in the following figure.

NOTE

TwisTorr 305 FS Remote Controller can be used as a bench unit or as a rack module, but it must be positioned so that free air can flow through the holes.

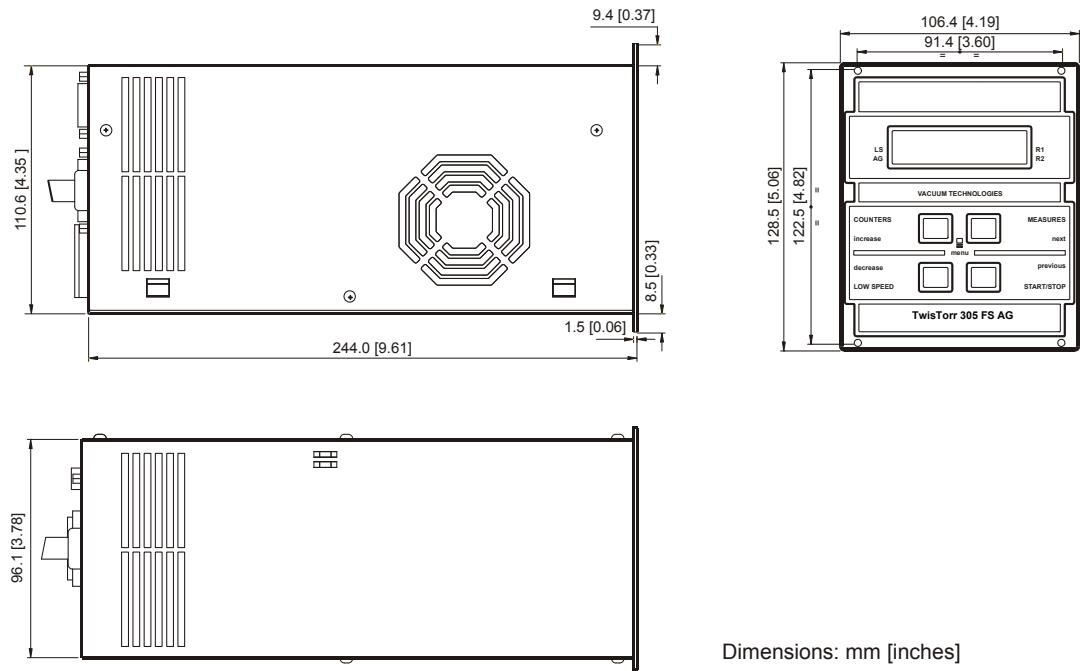


Figure 30 Controller outline

Controller Connection

J6 – Fan

The 24 Vdc, 150 mA maximum output voltage is present after START pushbutton is pressed and will remain present until a fault condition is displayed on front panel display or the turbopump is stopped.

This is a dedicated output for the optional TwisTorr 305 pump cooling fan (see orderable parts table).

If you already have fan installed, use the available adapter cable to connect to the pump.

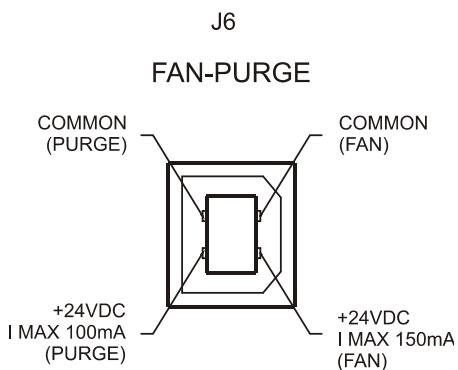


Figure 31 Fan Connector

J7 – Vent

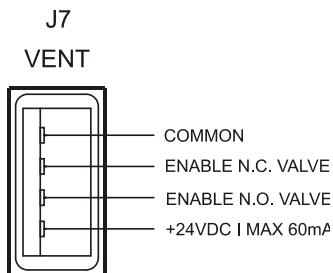


Figure 32 Vent Connector

Technical Information

This is dedicated 24 Vdc connector to control the optional vent valve (see orderable parts table). The vent valve can be driven by controller automatically or by serial line.

Three different vent modalities are available on the control unit:

On Command, Automatic, Auto Pump Speed.

- **On command** means that the valve is set to open or closed by the means of a specific serial command.
- **Automatic** means that the controller acts on the vent valve automatically, based on the turbo pump working status (Start, Ramp, Stop, Fail, etc..). It means that the valve is set to open/close, based on the working condition of the Turbo pump. It is possible to select the opening delay and the opening time by means of some specific serial command.

The figure shown below is referred to the Automatic vent mode.

- **Auto pump speed** means that the controller acts on the vent valve automatically, based on the pump status. Compared to the Automatic modality, the auto pump speed implements a pulsed opening/closing of the valve to optimize the deceleration of the turbo pump. This vent mode is fully automatic and hence it is not possible to select the opening delay and the opening time of the vent valve.

Please refer to the chapter "Technical Information", Window Meanings paragraph in order to get details about the serial commands related to the vent modes.

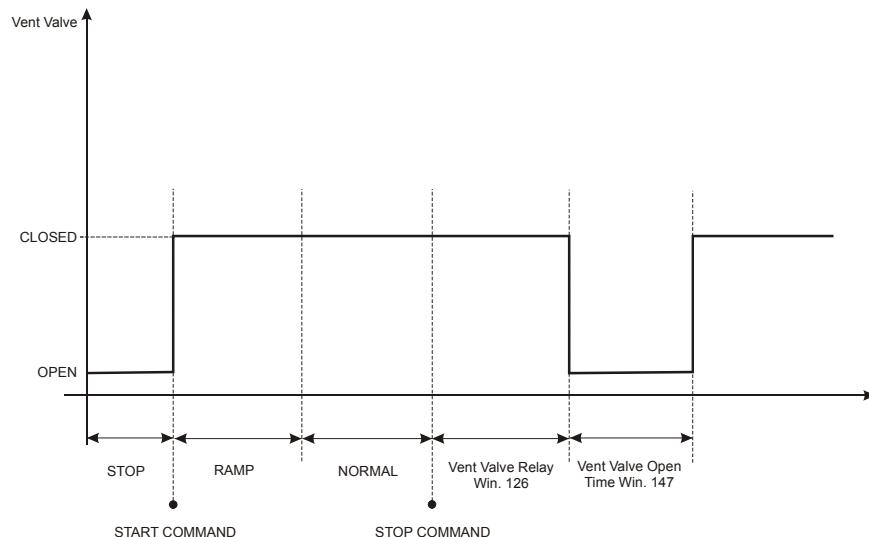


Figure 33 Vent Valve diagram in "Automatic" mode

Technical Information

P1 – Input

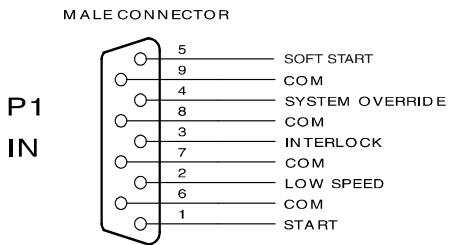


Figure 34 P1 input connector

All the logic input to the controller must be connected at J1 mating connector. With the provided P1 mating connector (shipped with pin 3 and pin 8 shorted) make the connections with AWG 24, (0.24 mm²) or smaller wire to the pins indicated in the figure to obtain the desired capability.

The following table describes the signals available on the connector.

Table 9

Pins	Name	Description	Electrical	Note
1-com	Start/Stop	Contact closed = Start Contact open = Stop	Optically isolated Vlow, max = 10v Imax = 5mA Imin (on) = 2mA	Active only in Remote Mode operation
2-com	Low Speed	Contact closed = Low Speed Contact open = High Speed	Optically isolated Vlow, max = 10v Imax = 5mA Imin (on) = 2mA	Active only in Remote Mode operation
3-com	Interlock	Contact closed = Active Contact open = Inactive If active allows the pump running, if inactive stops the pump.	Optically isolated Vlow, max = 10v Imax = 5mA Imin (on) = 2mA	Active in all modes
4-com	System Override	Contact closed Contact open If the contact is open, it allows the pump running; if the contact is closed, it stops the pump and all the others connected devices (Fan, Vent).	Optically isolated Vlow, max = 10v Imax = 5mA Imin (on) = 2mA	Active in all modes
5-com	Soft Start	Contact closed= Active Contact open= Inactive If active before the start command activates the Soft Start procedure. To be used only at first pump run-up.	Optically isolated Vlow, max = 10v Imax = 5mA Imin (on) = 2mA	Active only in Remote Mode operation, and in STOP status.

Technical Information

The following figure shows a typical contact logic input connection and the related simplified circuit of the controller.

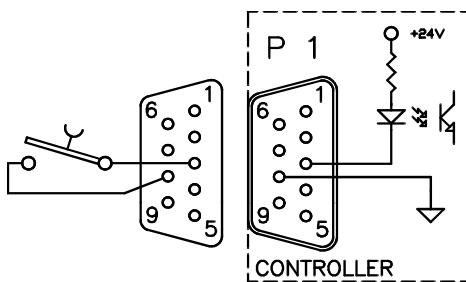


Figure 35 Typical logic input connection

J1 – Output

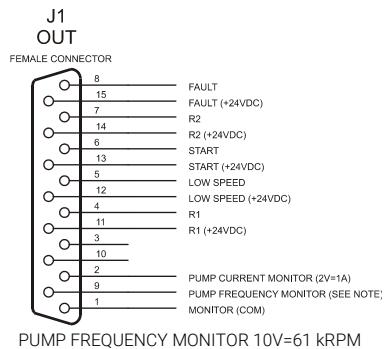


Figure 36 Typical logic input connection

Pump Connector

A five-meter long cable is available to connect the controller to the pump. The following figure shows the controller output connector configuration where pins:

- A-F = pump temperature sensor
- B-C-D = 75 Vac 3-phase output to pump motor stator
- E = EARTH PROTECTION

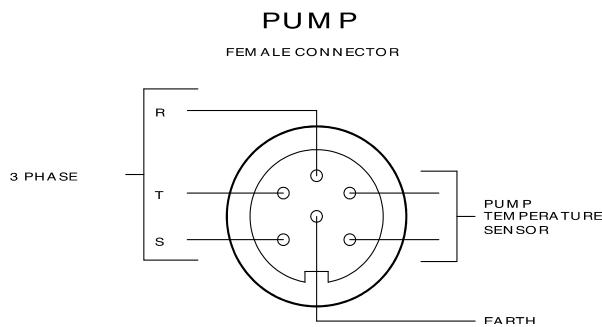


Figure 37 Controller-to-Pump Connector

J5 – Gauge Connector

This connector is available to connect the Agilent active gauges.

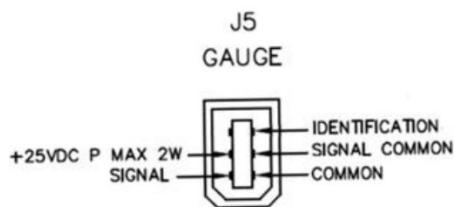


Figure 38 Gauge Connector

Technical Information

J2 – Serial Connector

This connector provides the connection for RS – 232 and RS – 485 serial line.

J2 Pin-out

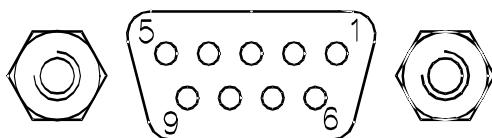


Figure 39 J2 Connector

Table 10

Pin N.	Signal Name
1	+5 V (OUT) (Reserved)
2	TX (RS232)
3	RX (RS232)
4	NC
5	GND
6	A + (RS485)
7	NC
8	B – (RS485)
9	RESERVED

Technical Information

NOTE

The maximum power provided by controller to drive a gauge is 5W, if your gauge requires more power you need an external power supply.

The controller recognizes automatically the gauge connected by reading the signal "identification" in the connector.

Following a table with the gauge supported:

Table 11

Gauge model	Name showed in the display
FRG 700/702	FRGa
IMG 500	IMG
PVG 500/502	PVGa
CDG 500 T1000	CDG3
CDG 500 T0100	CDG2
CDG 500 T0010	CDG1
CDG 500 T0001	CDG0

The controller gives the error "gauge error" if the gauge connected is not supported.

There are some gauges (for example the CDG family gauge) that have the same identification. In this case the controller recognizes the family of the gauge but the user should select the right gauge by front panel.

The pressure can be read by display, by serial line (win. 224) and by Remote I/O (Programmable Analog Out), but the controller doesn't replicate the signal from the gauge.

If the Programmable Analog Output is related to the pressure read by an external gauge, the controller doesn't replicate exactly the signal coming from the gauge; the controller converts the gauge signal in the range from 0 to 10V.

The conversion formula is the following:

$$V_{out} = \frac{V_g - V_{g_min}}{V_{g_max} - V_{g_min}} \times 10$$

Technical Information

Where:

V_g is the gauge output voltage;

V_{out} is the Analog Output voltage;

$V_{g_min} \div V_{g_max}$ is the gauge voltage measuring range. These values can be drawn from the gauge technical specifications or from the following table.

Table 12

ID	Gauge Model	Pressure range [mbar]	$V_{g_min} \div V_{g_max}$ [V]
1	CT-100	1.33E-2 to 1.01E3	1.11 ÷ 8.25
2	FRG-700/702	5E-9 to 1E3	1.82 ÷ 8.6
3	IMG-500	2E-9 to 1E-2	1.8 ÷ 8.5
4	PVG-500/502	5E-4 to 1E3	1.9 ÷ 10
6	PCG-750/752	5E-5 to 1.5E3	0.61 ÷ 10.23
9	CDG-500 T1000	2.66E+1 to 1.33E3	0.2 ÷ 10
10	CDG-500 T0100	2.66E+0 to 1.33E2	0.2 ÷ 10
11	CDG-500 T0010	2.66E-1 to 1.33E1	0.2 ÷ 10
12	CDG-500 T0001	2.66E-2 to 1.33	0.2 ÷ 10

Technical Information

When in programmable analog signal you read a voltage below the voltage range (in above table) it means "Error Over range", if you read a voltage below the voltage range it means "Error Under range" (in these cases you can read the manual of the gauge for further details).

With the serial communication you can use the following windows:

Win 224 Pressure reading with the format X.X E XX

Win 257 Gauge status (read only):

0 → when a gauge is not connected

1 → when a gauge is connected

2 → when the pressure read is under range or when
the gauge gives an internal error

3 → when the pressure read is under range or when the gauge
gives an internal error

4 → when the "identification" is present but not known by
the controller

Win 267 Gauge power (read/write):

If you need to turn off the gauge at certain condition you can use this window

0 → gauge off

1 → gauge on (default)

2 → gauge normally off. It turns on when the set point 1 is activated. If the set point 1 type (win 101) is selected as "pressure" the gauge is always on.

3 → gauge normally off. It turns on when the set point 1 is activated. If the set point 2 type (win 171) is selected as "pressure" the gauge is always on.

4 → gauge normally off. It turns on when the set point 1 is activated. If the set point 3 type (win 101) is selected as "pressure" the gauge is always on.

The windows from 136 to 140 manage an additional set point (set point 3) dedicated to turn ON or OFF the gauge (win 267=4).

Technical Information

All the logic output from the controller must be connected at P2 mating connector. The following table describes the signals available on the connector.

The following figure shows a typical logic output connection (relay coil) but any other device may be connected e.g. a LED, a computer, etc., and the related simplified circuit of the controller.

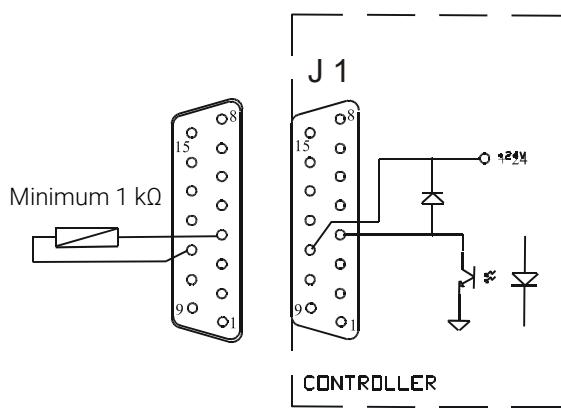


Figure 40 Digital Output Connection Example

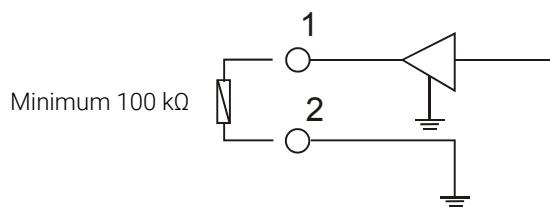


Figure 41 Analog Output Connection Example

Technical Information

Table 13

Pins	Name	Description	Electrical	Note
15-8	Fault	0V = no fail 24V = fail	Optically isolated Vmax (=open) = 24V Vlow, max = 1,5V Imax = 60mA Pin-8 negative Pin-15 positive	Connect a 10kohm resistor between the 2 pins before measuring voltage. A STOP command (by front Panel or serial or Start/stop input) reset the FAIL status.
13-6	Start	Configurable output. Default setting (win.177 = 0): 24V pump in RAMP state, 0V = other state. If win.177 = 1: 0V = pump in stop or FAIL status, 24V = other state	Optically isolated Vmax (=open) = 24V Vlow, max = 1,5V Imax = 60mA Pin-6 negative Pin-13 positive	Connect a 10kohm resistor between the 2 pins before measuring voltage.
12-5	Low Speed	24V = low speed active 0V = low speed not active	Optically isolated Vmax (=open) = 24V Vlow, max = 1,5V Imax = 60mA Pin-5 negative Pin-12 positive	Connect a 10kohm resistor between the 2 pins before measuring voltage.
11-4	R1	Programmable Set Point Out can be related to: Frequency, Power, Time Status or Pressure. See following figures for more details. All the setting can be done by: front panel or serial line (win.101 to 105 and 162).	Optically isolated Vmax (=open) = 24V Vlow, max = 1,5V Imax = 60mA Pin-7 negative Pin-14 positive	Connect a 10kohm resistor between the 2 pins before measuring voltage.
14-7	R2	Programmable Set Point Out Can be related to: Frequency, Power, Time Status or Pressure. See following figures for more details. All the setting can be done by: front panel or serial line (win.171 to 176).	Optically isolated Vmax (=open) = 24V Vlow, max = 1,5V Imax = 60mA Pin-7 negative Pin-14 positive	Connect a 10kohm resistor between the 2 pins before measuring voltage
2-1	Programmable Analog Output	Programmable analog output. Can be related to : frequency, power, pump temperature (linear) or pressure read by the external gauge. The setting can be done by: front panel or serial line (win.111). 0V = 0Hz, 0W, 0°C 10V = 1010Hz, 150W, 100°C See following chart for more details	Optically isolated Rload, min = 10kohm Ripple Vpp,max = 200mV Precision = 5% Resolution = 40mV Pin-1negative Pin-2 positive	Connect a 100kohm resistor between the 2 pins before measuring voltage
9-1	Frequency Analog Output	Analog output proportional to frequency (linear). 0V = 0Hz 10V = 1010Hz	Optically isolated Rload, min = 10kohm Ripple Vpp,max = 200mV Precision = 1% Resolution = 40mV Pin-1negative Pin-9 positive	

When the analog output is set to provide pressure signal, the voltage level is proportional to pressure level and it is generated by control unit elaborating the independent input by the active gauge.

R1 – R2 Output Diagram

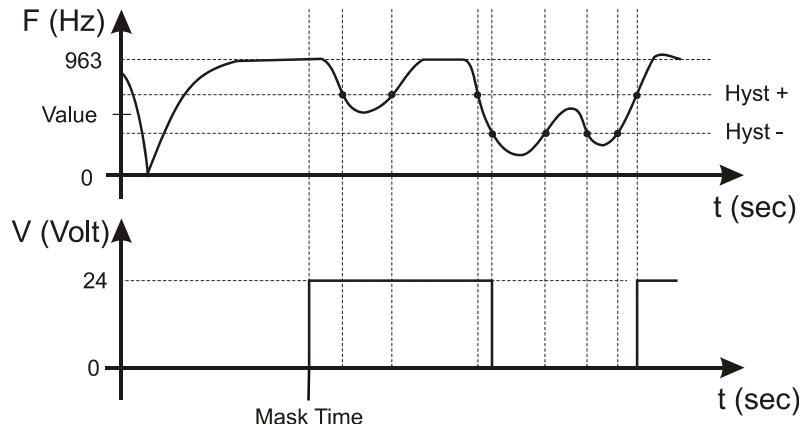


Figure 42 Diagram 1 – R1 or R2 related to frequency

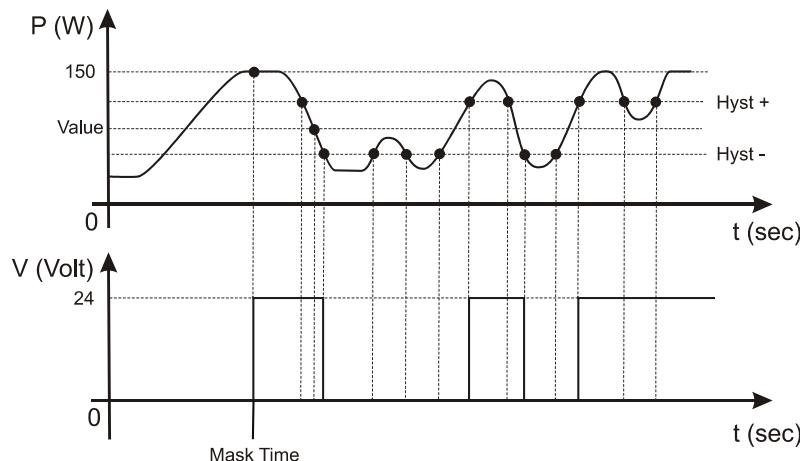


Figure 43 Diagram 2 – R1 or R2 related to powergram 2 – R1 or R2 related to power

Technical Information

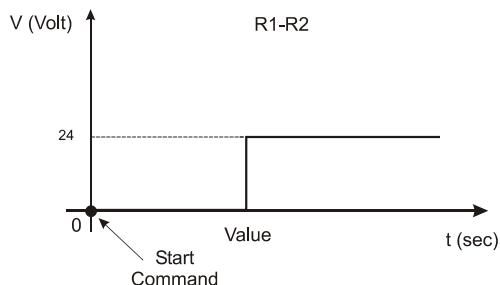


Figure 44 Diagram 3 – R1 or R2 related to time

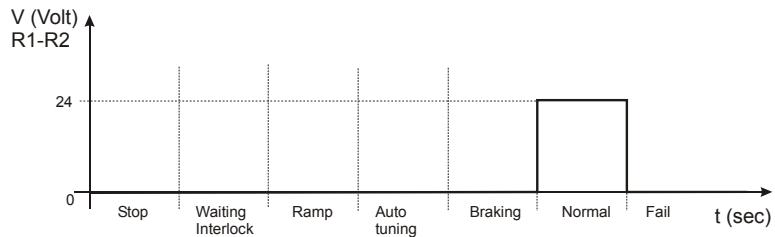


Figure 45 Diagram 4 – R1 or R2 related to Normal status

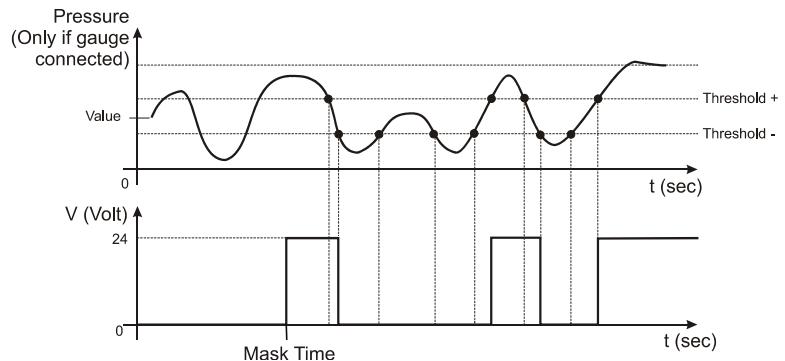


Figure 46 Diagram 5 – R1 or R2 related to pressure reading (if gauge connected)

Programmable Analog Output Diagrams

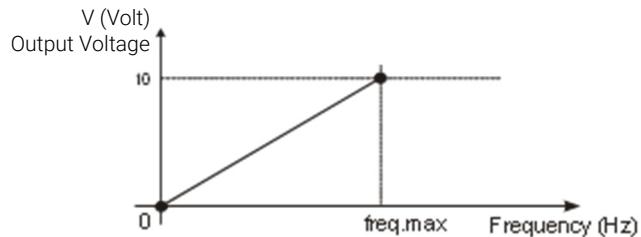


Figure 47 Diagram 1 – Programmable analog output related to frequency (freq.max = 1010Hz)

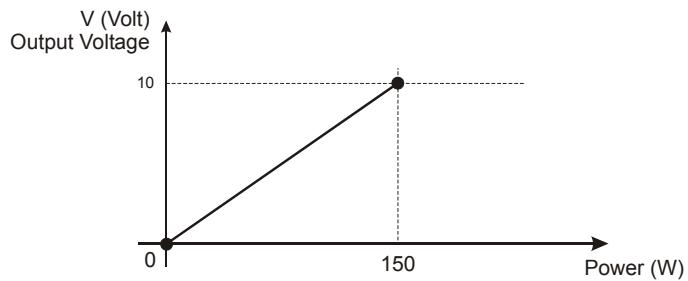


Figure 48 Diagram 2 – Programmable analog output related to power

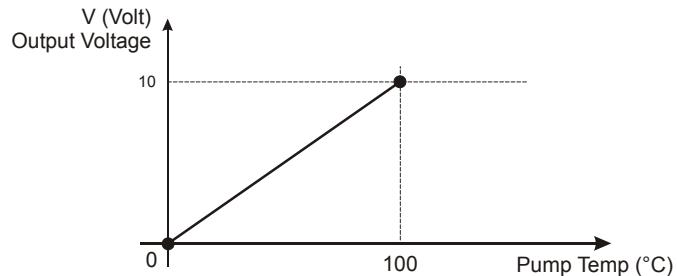


Figure 49 Diagram 3 – Programmable analog output related to pump temperature

Pump Driving

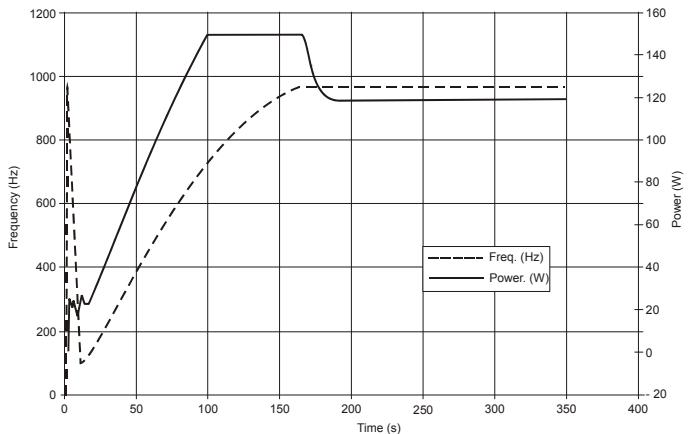


Figure 50 Diagram 4

Stop Speed Reading and Active Stop

This function can be activated by Front Panel or serial line (Win 107, 167).

Active Stop brakes the pump using the motor. The Stop Speed reading reads the pump speed after a stop command.

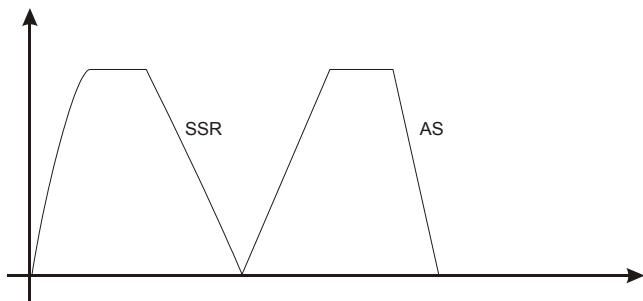


Figure 51 Diagram 5

Vacuum Link App

The Remote Controller can communicate with a smartphone connecting the accessory RS232 Serial to B/T Adapter (X3514-68003) to the serial port.

This accessory is a dongle to convert the serial communication to bluetooth communication.

In order to establish the communication between the controller and a smartphone, the Vacuum Link app must be installed first from Google Play or Apple Store. The app is available for both Android and iOS. Once installed, you can establish the connection. Using this app you will be able to read and write all controller parameters.

Procedure to Connect the Serial and I/O ports to an External Cable

In the following picture, it has showed the right procedure to connect a cable to the I/O or to the serial port. A shielded cable of 30 m maximum length has to be utilized for both serial and I/O port connection.

NOTE

Take care to have a good contact between the metallic case and the external shield of the wire. Moreover, this operation should be done at least on the controller side.

The I/O and communication terminal provided at the equipment are only required to be connected with external circuits which are separated from hazardous live voltages by reinforced or double insulation.

In this way, you will be sure to reduce the influence of the external noise and to accomplish the EMC requests. In picture d is showed the cable assembled.

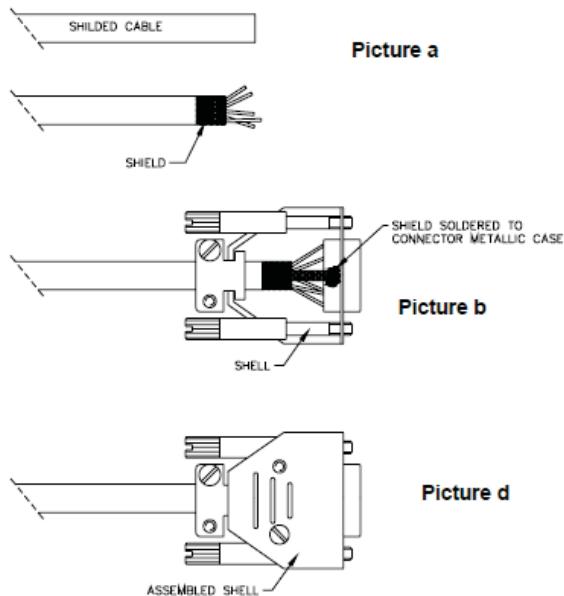


Figure 52

Connection Schematics

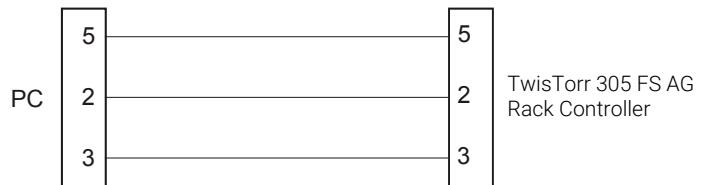


Figure 53 RS – 232 Connection

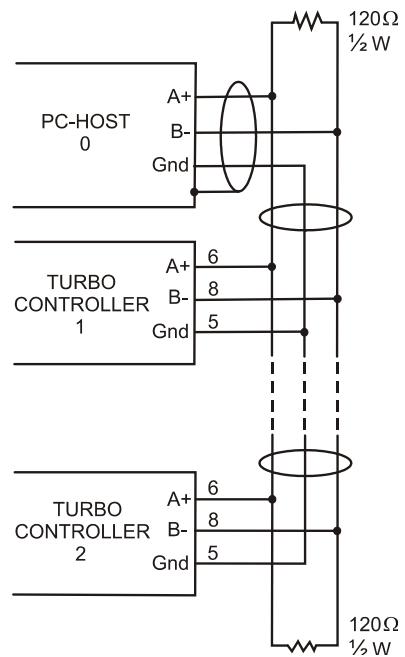


Figure 54 RS – 485 Connection

Technical Information

The communication port mating connector is supplied with the RS 232 PCB (AMP/Cannon or equivalent 15-pin "D" type male connector). For example, the Transmit data signal from controller (pin 2) must be connected to the host computer's receive data line (pin 2) and vice versa. Consult the host computer's instruction manual for its serial port connections.

NOTE

Agilent cannot guarantee compliance with FCC regulations for radiated emissions unless all external wiring is shielded, with the shield being terminated to the metal shroud on the O-subconnector. The cable should be secured to the connector with screws.

Serial Communication Descriptions

This unit can communicate by two different protocol:

- protocol (old system) "letter"
- "Window" protocol (new system)

These two protocols can be used as well with 232 or 485 media.

NOTE

Please use "Window" protocol for new development.

Letter Protocol Description

The default protocol is “Window”

Communication Format

- 8 data bit
 - no parity
 - 1 stop bit
 - The baud rate is programmable via front panel from 600 to 9600 baud.
The controller is factory-set for 9600 baud operation.

Communication protocol

Host = Master

Controller = Slave

The communication is performed in the following way:

Host Turbo-V Controller

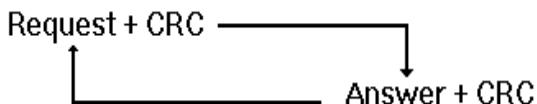


Figure 55

Allowed ASCII characters:

- "A" = START
 - "B" = STOP
 - "C" = Low Speed ON
 - "D" = Low Speed OFF
 - "E" = Request for operational parameters
 - "F" = Pump times zeroing
 - "G" = Parameters reading
 - "H" = Parameters writing
 - "I" = Request for operating status
 - "J" = Request for numerical reading
 - "K" = Request for counters reading.

CRC corresponds to the sum (with inverted sign) of all the preceding bytes.

Technical Information

e.g., the START command "A" in ASCII code = 41; inverted it will be: FF + 1 - 41 = BF.

Table 14

Character	ASCII	Converted ASCII for CRC Calculation
"A"	41h	-
CRC	-	BFh
"B"	42h	-
CRC	-	BEh
"C"	43h	-
CRC	-	BDh
"D"	44h	-
CRC	-	BCh
"E"	45h	-
CRC	-	BBh
"F"	46h	-
CRC	-	BAh
"G"	47h	-
CRC	-	B9h
"H"	48h	-
"I"	49h	-
CRC	-	B7h
"J"	4Ah	-
CRC	-	B6h
"K"	4Bh	-
CRC	-	B5h
"ACK"	06h	-
CRC	-	FAh
"NACK"	15h	-
CRC	-	EBh

Answer = after a request from the host, the controller will answer in one of the following ways:

- ACK
- NACK
- Message

When the Request is "A", "B", "C", "D", "F", the controller will answer the ACK or NACK.

Technical Information

When the Request is "E, the **Answer** will contain the complete set of the following parameters:

Table 15

Bytes	Meaning
MSB ---XXX	1 0 = STOP 1 = WAITING INTERLOCK 2 = STARTING 3 = NORMAL OPERATION 4, 5 = HIGH LOAD 6 = FAILURE 7 = APPROACHING LOW SPEED
2÷5	Cycle Time
6÷9	Pump Life
10÷11	Pump Temperature
12	Current*
13	Voltage*
14÷17	Frequency
18÷19	Cycle #
20	R1 Status
21	R2 Status
22	CRC

* The values for current and voltage are given as numbers, scaled from 0 to 255 where 0 corresponds to 0 V and 255 to the full scale voltage (130 V) or current (2.5 A).

Technical Information

When the **Request** is "G", the **Answer** will contain a string of 11 characters with the following parameters:

Table 16

Bytes	Meaning
1-2	Pump cycles number (integer coded in 2 bytes)
3	Speed threshold
4-7	Run up time in seconds (long coded in 4 bytes)
8	Deat time (0 = NO 1 = YES)
9	Reserved
10	Soft Start mode (0 = NO 1=YES)
11	CRC

When the configuration parameters have to be changed, send a **Request** string a string with 9 characters of the following type:

"H" + data + CRC

The following parameters can be changed:

Table 17

Bytes	Meaning
1	Speed threshold
2-5	Run up time in seconds (long coded in 4 bytes)
6	Deat time (0 = NO 1 = YES)
7	Reserved
8	Soft Start mode (0 = YES 1 = NO)
9	CRC

Technical Information

When the **Request** is "I" (Status readings), the **Answer** will contain a string of 2 characters with the following parameters:

Table 18

Bytes	Meaning
1	<p>MSB LSB</p> <p>-- X X X X X X</p> <p>0 = STOP 1 = WAITING INTERLOCK 2 = STARTING 3 = NORMAL OPERATION 4, 5 = HIGH LOAD 6 = FAILURE 7 = APPROACHING LOW SPEED</p>
2	CRC

Technical Information

When the **Request** is "J" (Numerical readings), the **Answer** will contain a string of 5 characters with the following parameters:

Table 19

Bytes	Meaning
1	Current (0-255 scaled)
2	Voltage (0-255 scaled)
3	Rotational speed KRPM
4	Pump temperature °C (0-254 temperature reading, 255 = fail)
5	CRC

When the **Request** is "K" (Counters readings), the **Answer** will contain a string of 11 characters with the following parameters:

Table 20

Bytes	Meaning
1-4	Cycle time
5-8	Pump life
9-10	Cycle number
11	CRC

On request a sample program in QBasic language is available by Agilent.

Window Protocol Description

Communication Format

- 8 data bit
- no parity
- 1 stop bit
- baud rate: 600/1200/2400/4800/9600 programmable

Communication Protocol

The communication protocol is a MASTER/SLAVE type where:

- Host = MASTER
- Controller = SLAVE

The communication is performed in the following way:

- 1 the host (MASTER) send a MESSAGE + CRC to the controller (SLAVE);
- 2 the controller answer with an ANSWER + CRC to the host.

The MESSAGE is a string with the following format:

<STX>+<ADDR>+<WIN>+<COM>+<DATA>+<ETX>+<CRC>

Where:

NOTE

When a data is indicated between two quotes (...) it means that the indicated data is the corresponding ASCII character.

Technical Information

- <STX> (Start of transmission) = 0x02
- <ADDR> (Unit address) = 0x80 (for RS 232)
- <ADDR> (Unit address) = 0x80 + device number (0 to 31) (for RS 485)
- <WIN> (Window) = a string of 3 numeric character indicating the window number (from '000' to '999'); for the meaning of each window see the relevant paragraph.
- <COM> (Command) = 0x30 to read the window, 0x31 to write into the window
- <DATA> = an alphanumeric ASCII string with the data to be written into the window. In case of a reading command this field is not present.

The field length is variable according to the data type as per the following table:

Table 21

Data Type	Field Length	Valid Characters
Logic (L)	1	'0' = OFF '1' = ON
Numeric (N)	6	'-' , ',' , '0' . . . '9' right justified with '0'
Alphanumeric (A)	10	from blank to '_' (ASCII)

- <ETX> (End of transmission) = 0x03
- <CRC> = XOR of all characters subsequent to <STX> and including the <ETX> terminator. The value is hexadecimal coded and indicated by two ASCII character.

The addressed SLAVE will respond with an ANSWER whose structure depends from the MESSAGE type. When the MESSAGE is a reading command, the SLAVE will respond transmitting a string with the same structure of the MESSAGE.

NOTE

Using the RS 485 interface, the message structure remains identical to the one used for the RS 232 interface, the only difference being that the value assigned to the ADDRESS <ADDR>.

Technical Information

The controller can answer with the following response types:

Table 22

Response Type	Response Length	Response Value	Description
Logic	1 byte	-	After a read instruction of a logic window
Numeric	6 bytes	-	After a read instruction of a numeric window
Alphanumeric	10 bytes	-	After a read instruction of an alphanumeric window
ACK	1 byte	(0x6)	The command execution has been successfully completed
NACK	1 byte	(0x15)	The command execution has been failed
Unknown Window	1 byte	(0x32)	The specified window in the command is not a valid window
Data Type Error	1 byte	(0x33)	The data type specified in the command (Logic, Numeric or Alphanumeric) is not accorded with the specified Window
Out of Range	1 byte	(0x34)	The value expressed during a write command is out of range value of the specified window
Win Disabled	1 byte	(0x35)	The specified window is Read Only or temporarily disabled (for example) you can't write the Soft Start when the Pump is running)

Examples

Command: START

Source: PC

Destination: Controller

02	80	30	30	30	31	31	03	42	33
STX	ADDR	WINDOW		WR	ON	ETX	CRC		

Source: Controller

Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Command: STOP

Source: PC

Destination: Controller

02	80	30	30	30	31	30	03	42	32
STX	ADDR	WINDOW		WR	OFF	ETX	CRC		

Source: Controller

Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Technical Information

Command: SOFT-START (ON)

Source: PC

Destination: Controller

02	80	31	30	30	31	31	03	42	32
STX	ADDR	WINDOW		WR	ON	ETX	CRC		

Source: Controller

Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Command: SOFT-START (OFF)

Source: PC

Destination: Controller

02	80	31	30	30	31	30	03	42	33
STX	ADDR	WINDOW		WR	OFF	ETX	CRC		

Source: Controller

Destination: PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Technical Information

Command: READ PUMP STATUS

Source: PC

Destination: Controller (with address = 3)

02	83	32	30	3 5	30	03	38	37
STX	ADDR	WINDOW		RD	ETX	CRC		

Source: Controller (with address = 3 in stop status)

Destination: PC

02	83	32	30	35	30	30	30	30	30	03	38	37
STX	ADDR	WINDOW			DATA (STATUS)			ETX	CRC			

02 80 15 03 09 06 -> NACK

Command: REAL SERIAL TYPE

Source: PC

Destination: Controller (with address = 3 in 485 mode)

02	83	35	30	34	30	03	38	31
STX	ADDR	WINDOW		RD	ETX	CRC		

Source: Controller

Destination: PC

02	83	35	30	34	30	31	03	42	30
STX	ADDR	WINDOW		RD	DATA	ETX	CRC		

Window Meanings

Table 23

WIN#	Read/ Write	Type	Meaning	Admitted Values	Factory Set
0	R/W	L	Start/Stop (in remote/ Front mode the window is a read only)	Start = 1 Stop = 0	0
1	R/W	L	Low Speed Activation	No = 0 Yes = 1	0
8	R/W	A/L	Serial/Remote/Front/FieldBus Contr. Configuration	0 = Serial 1 = Remote 2 = Front 3 = Profibus	1
100	R/W	L	Enable/Disable Soft Start (write only in Stop condition)	Enable = 1 Disable = 0	"1" at the first START, then "0"
101	R/W	N	R1 Set Point type	0 = Frequency 1 = Power 2 = Time 3 = Normal 4 = Pressure (available only if the gauge is connected)	3
102	R/W	N	R1 Set Point value (expressed in Hz/W/s/mbar)	0,999999	867
103	R/W	N	R1 Set Point delay: time between the pump start and the set point check (seconds)	0,999999	0
104	R/W	L	R1 Set Point signal activation type: the signal can be "high level active" or "low level active", "high level active" indicates the output is ON when the signal is above the threshold	0 = high level active 1 = low level active	0
105	R/W	N	R1 Set point hysteresis (in % of R1 value)	0,100	2
107	R/W	L	Active Stop (write only in stop) Enable/disable the stop with active braking	Enable = 1 Disable = 0	0
108	R/W	N	Serial comm. baud rate	0 = 600 bit/s 1 = 1200 bit/s 2 = 2400 bit/s 3 = 4800 bit/s 4 = 9600 bit/s	4
109	W	L	Pump life/Cycle time/Cycle number reset	To reset write '1'	
110	R/W	L	Interlock type. The interlock can be checked at start (impulse) or continuously	Impulse = 0 Continuous = 1	

Technical Information

WIN#	Read/ Write	Type	Meaning	Admitted Values	Factory Set
111	R/W	N	Analog output type: output voltage signal proportional to frequency, power, temperature or pressure	0 = Frequency 1 = Power 2 = Temperature 3 = Pressure	1
117	R/W	N	Low Speed frequency value (Hz)	from 700 to 1010 Hz	700
120	R/W	N	Rotational frequency setting (Hz)	from low speed frequency (win 117) to 1010 Hz	1010
122	R/W	L	Set vent valve (on/off) (write if Win125 = 1)	On = 1	
123			Reserved to Agilent Service		
124			Reserved to Agilent Service		
125	R/W	A/L	Set the vent valve operation	0 = Automatic 1 = On command 2 = Auto pump speed	0
126	R/W	N	Vent valve opening delay (1unit = 0.2s)	0,65535 (from 0 to 13107s)	15
130			Reserved to Agilent Service		
136	R/W	N	Gauge Set Point Type (for TwisTorr 74 FS, TwisTorr 305 FS and TwisTorr 305 FSQ)	0 = Frequency 1 = Power 2 = Time 3 = Normal	3
137	R/W	N	Gauge Set Point Value (Hz/W/s/mbar)	0,999999	867
138	R/W	N	Gauge Set Point delay: time (s) between the pump start and the set point check (seconds)	0,999999	0
139	R/W	L	Gauge Set Point Signal Activation Type the signal can be "high level active" or "low level active"; "high level active" indicates the output is ON when the signal is above the threshold	0 = high level active 1 = low level active	0
140	R/W	N	Gauge Set point hysteresis (in % of gauge set point value)	0,100	2
143	R/W	N	External fan configuration	0 = Always On 1 = Controlled by Serial	0
144	R/W	L	External fan activation	On = 1 Off = 0	0
147	R/W	N	Vent valve opening time (1unit = 0.2s; 0 = infinite) (Ref. to "vent connector" paragraph)	0,65535 (from 0 to 13107s)	0
155	R	N	Actual maximum power limit (W) (It reads the maximum power deliverable to the pump)		

Technical Information

WIN#	Read/ Write	Type	Meaning	Admitted Values	Factory Set
157	R/W	N	Gas load type (it sets the gas type to be used with the pump)	0 = Ar 1 = N2 2 = He	0
162	R	A	R1 Set Point Pressure Threshold Data format: X.X EsXX (with X = 0 to 9; s = + or -) Threshold value is meaningful if win101 = 4		
163	R/W	N	Unit of measure for pressure (for TwisTorr 74 FS AG Rack and TwiTorr 305 FS Remote)	0 = mbar 1 = Pascal 2 = Torr	0
167	R/W	L	Stop Speed Reading Enables/Disables the reading of the pump speed after a stop command	Enable = 1 Disable = 0	0
171	R/W	N	R2 Set Point Type	0 = Frequency 1 = Power 2 = Time 3 = Normal 4 = Pressure (available only if the gauge is connected)	3
172	R/W	N	R2 Set Point value (expressed in Hz/W/s/mbar)	0,999999	867
173	R/W	N	R2 Set Point delay: time between the pump start and the set point check (seconds)	0,999999	0
174	R/W	L	R2 Set Point signal activation type: the signal can be "high level active" or "low level active"; "high level active" indicates the output is ON when the signal is above the threshold	0 = high level active 1 = low level active	0
175	R/W	N	R2 Set point hysteresis (in % of R2 value)	0,100	2
176	R	A	R2 Set Point Pressure Threshold Data format: X.X EsXX (with X = 0 to 9; s = + or -) Threshold value is meaningful if win101 = 4		
177	R/W	L	Start Output Config.	0 = Starting (Output ON only with pump Status = Starting) 1 = Running (Output ON when the pump is running)	0

Technical Information

WIN#	Read/ Write	Type	Meaning	Admitted Values	Factory Set
181	R/W	N	Gauge Gas Type (TPS-mobile equipped with 551 pump does not have this window)	0 = Not configured 1 = Nitrogen 2 = Argon 3 = Hydrogen 4 = Other	0
182	R/W	N	Correction Factor for Custom Gauge	10,999	
200	R	N	Pump current (mA dc); it reads the actual value of the bus current supplied by controller to electric motor		
201	R	N	Pump voltage (Vdc); it reads the actual value of the peak 3ph.voltage supplied by controller to the electric motor		
202	R	N	Pump power (W); it reads the actual value of power supplied by controller to electric motor		
203	R	N	Driving frequency (Hz)		
204	R	N	Pump temperature (°C)		
205	R	N	Pump status	0 = Stop 1 = Interlock 2 = Ramp 3 = Autotuning 4 = Braking 5 = Normal 6 = Fail	
206	R	N	Error code (2x)	(bit description) 7 = Too High Load 6 = Short Circuit 5 = Over Voltage 4 = Override 3 = Run Up time 2 = Controller Over Temp 1 = Pump Over Temp 0 = No connection to pump	
211	R	N	Controller heatsink temperature (°C)		
216	R	N	Controller cooling air temperature (°C)		
224	R	N	Pressure reading Format = X.X E XX		
226	R	N	Rotation Frequency (rpm)		
257	R	N	Gauge Status (TPS-mobile equipped with 551 pump does not have this window)	4 = RidUnknown 3 = GaugeOverRange 2 = GaugeUnderRange 1 = GaugeConnected 0 = NoGaugeConnected	

Technical Information

WIN#	Read/ Write	Type	Meaning	Admitted Values	Factory Set
267	R/W	N	Gauge Power Mode (TPS-mobile equipped with 551 pump does not have this window)	4 = Power On Set Point 3 3 = Power On Set Point 2 2 = Power On Set Point 1 1 = Power On Always 0 = No Power	
300	R	N	Cycle time in minutes; it indicates the time of the last cycle (from the last start to the current time, if the pump is running)	0,999999	
301	R	N	Cycle number; it indicates the number of cycles start/stop during the whole pump life.	0,9999	
302	R	N	Pump life in hours		
320			Reserved to Agilent Service		
...			Reserved to Agilent Service		
399			Reserved to Agilent Service		
400	R	A	Program Listing CRC		
402	R	A	Parameter Listing CRC		
404	R	A	Parameter Listing Struct.CRC		
500			Reserved to Agilent Service		
503	R/W	N	RS485 address	0,31	
504	R/W	L	Serial type selection	0 = RS232 1 = RS485	0
724	R/W	N	Run Up time (minutes)	0,30	15
725	R/W	L	Run Up time control	On = 1 Off = 0	1

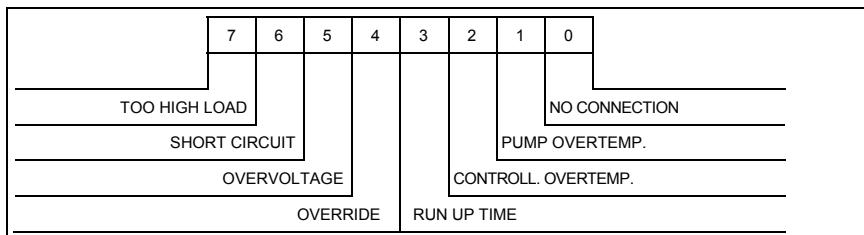


Figure 56 Window N. 206 Bit Description

How to Use by Front Panel

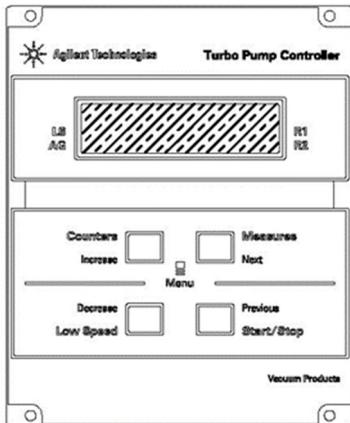


Figure 57

- **Start Stop and Reset Fail button**

Press once for the START command and again for the STOP command. In the case of controller's failure, press once to reset the fail condition.

NOTE

The front panel START/STOP function is available only if the controller is set to "FRONT mode". If it is set to "REMOTE mode", when the key is pressed an error message is shown indicating "COMMAND LOCKED IN REMOTE", if it is set to "SERIAL" mode, the "COMMAND LOCKED IN SERIAL MODE" error message is displayed. The "Reset Fail" function is always available regardless of controller mode.

- **Low Speed**

Press once to activate the LOW SPEED command; press again to de-activate.

NOTE

The front panel LOW SPEED function is available only if the controller is set to "FRONT"; otherwise an error message is returned. If it is set to "REMOTE" mode, the COMMAND LOCKED IN REMOTE error message is displayed while if it is in "SERIAL" mode the "COMMAND LOCKED IN SERIAL MODE" error message is returned.

Technical Information

- **Counters**

Pressing the first time on the display, the following information is displayed:

				C	Y	C	L	E		X	X	X	X			
			T	I	M	E			X	X	X	X	X	m		

Where:

CYCLE XXXX Number of start/stop cycles

TIME XXXXXm Time of last cycle (minutes)

Pressing a second time, the following is displayed:

			P	U	M	P		L	I	F	E					
				X	X	X	X	X	X	h						

PUMP LIFE

XXXXXX total operating time (hours) of the pump

Pressing a third time, the following message is displayed:

	M	N	:		X	X	X	X	X	X	X	X	X	X		
	S	N	:		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		

MN Model Number of the controller

SN Serial Number

On pressing the key again, the main screen page is redisplayed.

- **Measures**

Pressing once, the following is obtained:

P	=	X	X	X	W					X	X	X	X	H	z	
					T	=	X	X	°	C						

Technical Information

Where:

P = XXX W is the current power supplied to the pump

T = XX °C is the current temperature of the pump

XXXX Hz is the current frequency of rotation of the pump. This value is set by default to 1010 Hz but can be modified by the user according to needs, proceeding as described in the “PROGRAMMING” paragraph. The unit of measurement (HZ / Krpm, default = Hz) is selected by the user from the INPUT/OUTPUT->SPED menu.

If the Soft Start function is active and the pump is ramping-up to speed, the display's indication for the rotational speed is replaced by a bar graph indicator which shows in real time the Soft Start speed step that is in progress (out of the total number of steps which are foreseen by the driving algorithm); in addition, the message “SOFT START MODE” will appear on the display, on alternate to all the other messages, until the Soft Start is not completed successfully.

Once the Soft Start has been completed successfully, the bar graph indicator is replaced by the rotating speed value and the “SOFT START MODE” message is no more displayed.

Pressing twice, the following is obtained:

N	O	R	M	A	L				X	X	X	X	H	z
I	=	X	.	X	X	A		V	=	X	X	X	V	

Where:

NORMAL: indicates the operating regime of the pump

XXXHz: see description “Pressing once” **Measures** key

I=X.XXA: indicates the current absorbed by the pump

V= XXX V: indicates the pump driving voltage

Pressing 3 times, the following is obtained:

P	=	X	X	X	W				X	X	X	X	H	z
		X	.	X	X	E	-	Y	Y	m	B	a	R	

Technical Information

X	.	X	E	-	Y	Y	m	B	a	r		Z	Z	Z	Z
	P	=	X	X	X	W			X	X	X	X	H	z	

Where:

P= XXXW: indicates the current power supplied to the pump

XXXHz: see description "Pressing once" **Measures** key

X.XE-YYmBar: indicates the pressure currently measured by the gauge.

ZZZZ: indicates the kind of gauge (see table of gauge supported in the gauge chapter)

Other possible indications:

P	=	X	X	X	W					X	X	X	X	H	z
		G	A	U	G	E		E	R	R	O	R			

Where:

GAUGE_ERROR: gauge not connected or broken

P	=	X	X	X	W					X	X	X	X	H	z
	P	R	E	S	S	U	R	E		U	N	D	E	R	

Where:

PRESS UNDER: indicates that the pressure read is below the minimum measurement threshold set (5 E-9 mBar)

P	=	X	X	X	W					X	X	X	X	H	z
	P	R	E	S	S	U	R	E		O	V	E	R		

Technical Information

Where:

PRESS OVER: indicates that the pressure measured is above the maximum measurement threshold set (1000 mBar)

The unit of measurement of the pressure can be selected (GAUGE menu→Unit) from "mBar","Pa","torr"

Pressing 4 times returns to the following screen page:

N	O	R	M	A	L				X	X	X	X	H	z
X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Where:

NORMAL: indicates the operating regime of the pump

XXXHz: see description "Pressing once" **Measures** key

The operating mode of the controller is shown at the bottom in the center. This may be:

FRONT: front mode (the controller accepts START/STOP and LOW SPEED commands from the front panel)

REMOTE: remote mode (the controller accepts START/STOP and LOW SPEED commands via the rear connector)

RS232: the controller accepts commands from the serial port according to the RS232 standard.

RS485 [XX]: the controller accepts commands from the serial port in RS485 mode with address XX (XX from 0 to 31)

PROFIBUS [YYY]: the controller accepts commands from the PROFIBUS port with address YYY

Technical Information

Black rectangles as shown below may be displayed at any time in the first and last box of the bottom line of the display (opposite the LS / AG / R1 / R2 captions). The meaning of these rectangles is as follows:

LS → the controller is at LOW SPEED

AG → the Gauge is connected to the controller

R1 → relay (set point) R1 is active

R2 → relay (set point) R2 is active

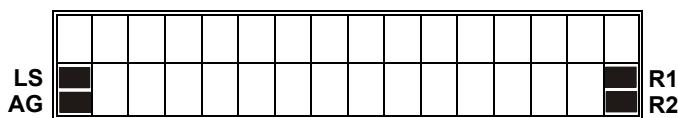


Figure 58

Startup

- Plug the controller power cable into a suitable power source.
The display lights up for approx. 2 seconds and shows:

				A	U	T	O	T	E	S	T				
							O	K							

- After 2 seconds, the display shows the following screen page:

S	T		O	P						H	z
					F	R	O	N	T						

NOTE

If the pump is not connected, the display will be as follows:

C	H	E	C	K		C	O	N	N	E	C	T	I	O	N
			T	O		P	U	M	P						

- Pressing the START button, the pump is started and the display shows the following screen page.

S	T	A	R	T	I	N	G		X	X.	X	X	H	z	
					F	R	O	N	T						

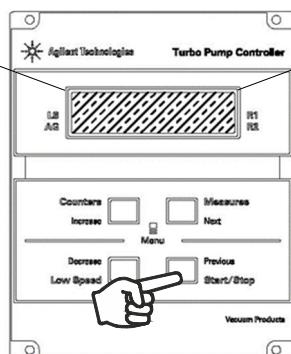


Figure 59

Technical Information

This screen page will be visible throughout the acceleration phase the pump. The increasing value of the rotation frequency will be displayed in the boxes marked X; the user may decide to express this value in Hz (default) or in KRMP.

Once operating speed has been reached, the following screen page is displayed:

N	O	R	M	A	L					1	0	1	0	H	z
					F	R	O	N	T						

If the LOW SPEED key is pressed, the above screen page changes to:

B	R	A	K	I	N	G				X	X	X	X	H	z
					F	R	O	N	T						

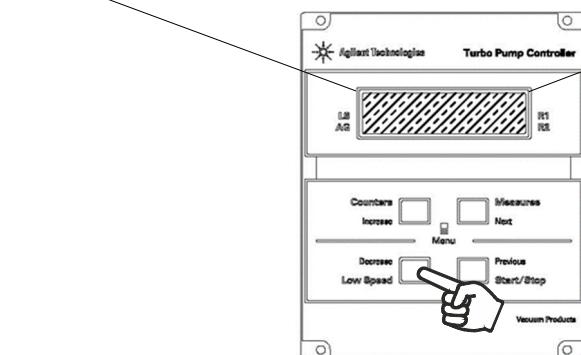


Figure 60

Technical Information

The following screen page is displayed on reaching the pre-established speed:

N	O	R	M	A	L						7	0	0	H	z
					F	R	O	N	T						

The rotation value set in both NORMAL and LOW SPEED mode can be modified by the user as described in the Programming section of this manual.

- Press the MEASURES push button: the display shows:

P	=		5	0	W					1	0	1	0	H	z
					T	=	4	5	°	C					

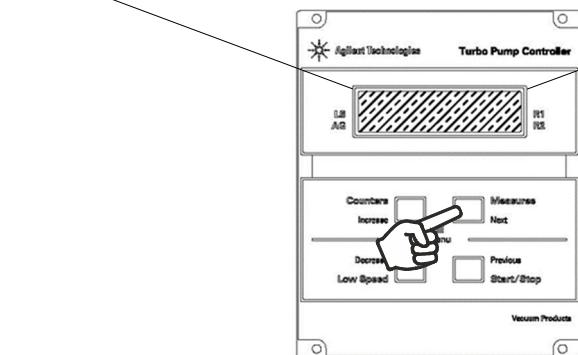


Figure 61

Where:

P = is the DC power drawn by the pump (range 0 to 999 Watt)

Hz = is the rotational speed of the pump as a function of the controller output frequency

°C = is the temperature of the outer ring of the upper bearing (range 00 to 99 °C)

- Pressing MEASURES key twice, the following screen page is displayed:

N	O	R	M	A	L					1	0	1	0	H	z
	I	=	1	.	2	0	A	V	=	4	2	V			

Technical Information

Where:

I is the current supplied by the controller to the pump at that precise moment.

V is the voltage at which the controller is powering the pump at that moment

- Pressing the MEASURES key three times, with the GAUGE connected and functioning, the following screen page is displayed:

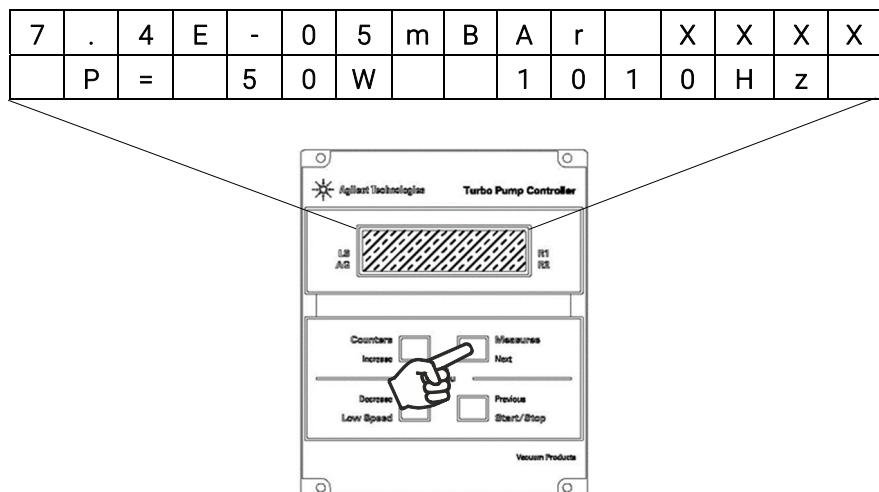


Figure 62

Where:

mBar shows the pressure value measured.

XXXX shows the kind of gauge connected.

Technical Information

The following messages may be displayed instead of the pressure:

GAUGE ERROR: indicates that the GAUGE is not identified

PRESSURE UNDER: indicates that a pressure below the minimum threshold set has been measured

PRESSURE OVER: indicates that a pressure exceeding the maximum threshold set has been measured

- Pressing the COUNTERS key, the following is obtained:

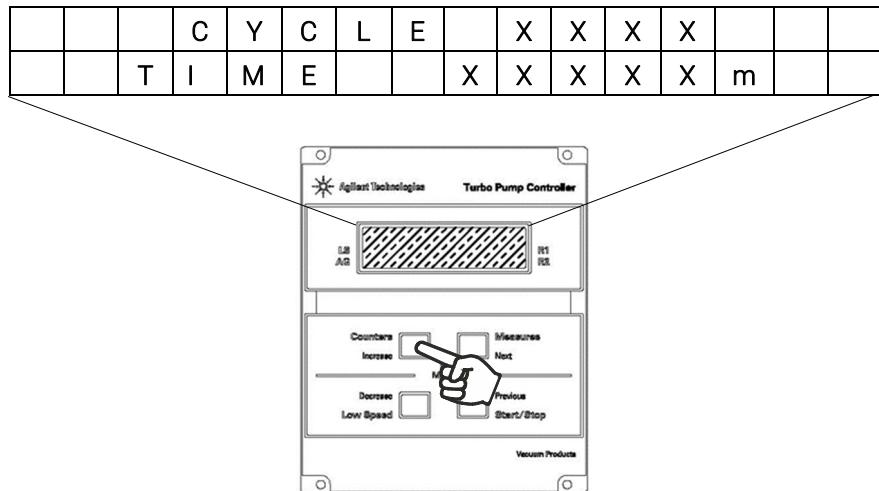


Figure 63

Where:

CYCLE XXXX Number of start/stop cycles

TIME XXXXXm Time of last cycle (minutes)

Pressing again:

			P	U	M	P		L	I	F	E			
			X	X	X	X	X	X	X	h				

Where:

PUMP LIFE XXXXXX Total operating time (hours) of the pump

Programming

Configuration Menu

To access the configuration menu, press the COUNTERS + MEASURES buttons at the same time for at least 2 sec.

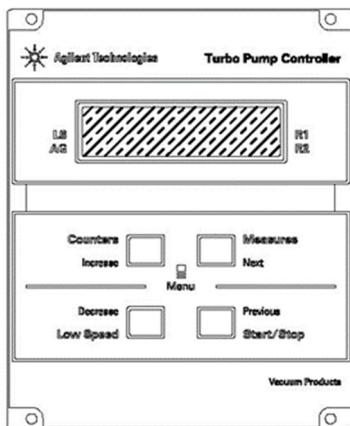


Figure 64

In programming mode, the meaning of the 4 buttons changes as follows:

- COUNTERS/LOW SPEED speed become “**INCREASE** and **DECREASE**” and make it possible to select the next or previous value of a parameter (in the case of compulsory parameters) or to increase/decrease the individual digit of a parameter (in the case of numeric parameters)
- The “**MEASURES** and **START/STOP**” buttons become “**NEXT** and **PREVIOUS**” and make it possible to select the next parameter (or next digit of a numeric parameter) or previous parameter.

Technical Information

Switching from one parameter to the next (using the "NEXT" key) indicates confirmation of any changes made to the specific parameter. If the changes cannot be accepted by the controller, the "**Data out of limits**" error message is displayed, the changes are cancelled and the value of the parameter prior to the modification is reproposed.

Switching from a parameter to the previous parameter (using the "PREVIOUS" key) indicates the intention to abort any changes made to the specific parameter. Abort is indicated by the caption "**Changes aborted**" that is displayed for approx. 1 second before moving to the previous parameter.

The configuration environment has a tree-like structure and permits "circular" navigation; on reaching the end of a branch, the user is returned automatically to the start of this. Navigation can proceed in a forwards (**NEXT** button) or backwards (**PREVIOUS** button) direction

It is possible to enter a sub-branch by pressing the "**INCREASE**" button. If no buttons are pressed for more than 1 minute, the controller automatically quits the programming environment canceling any modifications made to the current parameter.

The figure below shows the first level of the configuration menu and the links to the respective second level menus (indicated below).

Technical Information

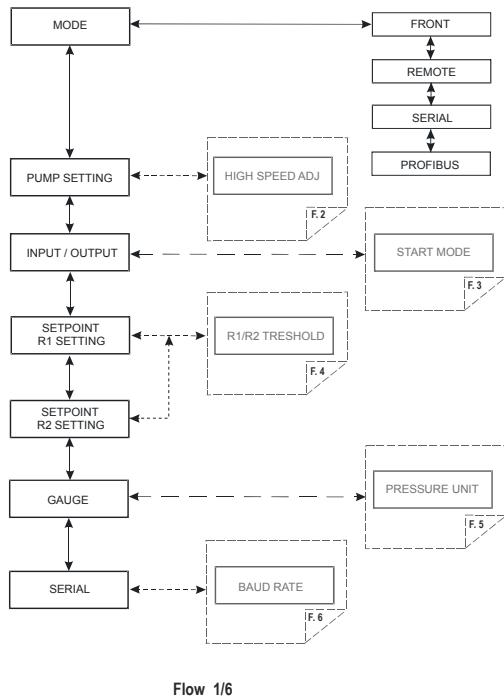


Figure 65

Mode Menu

- **MODE**: permits selection (see Flow 1/6) of the operating mode of the controller from those indicated below:
 - FRONT: accepts commands from the front panel
 - REMOTE: accepts commands from the remote input connector
 - SERIAL: accepts commands from the serial interface (or Profibus interface if present)
 - PROFIBUS: this operating mode is present only if the Profibus interface is installed on the controller.

Pump Setting Menu

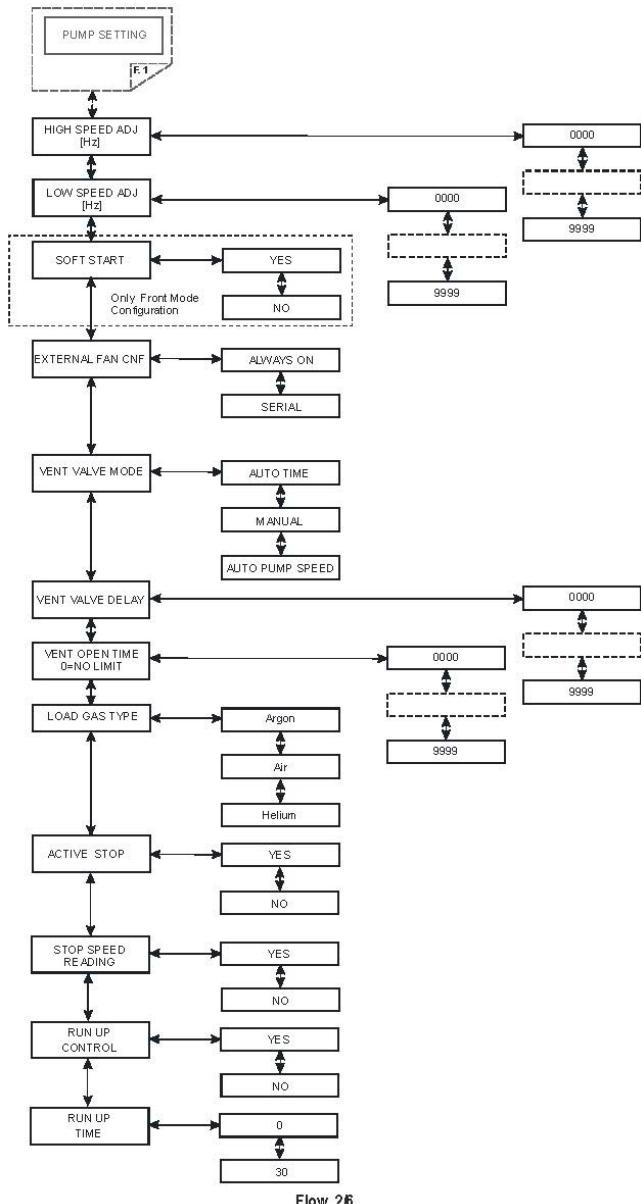


Figure 66

Technical Information

This menu contains all the parameters that have a direct effect on driving of the pump.

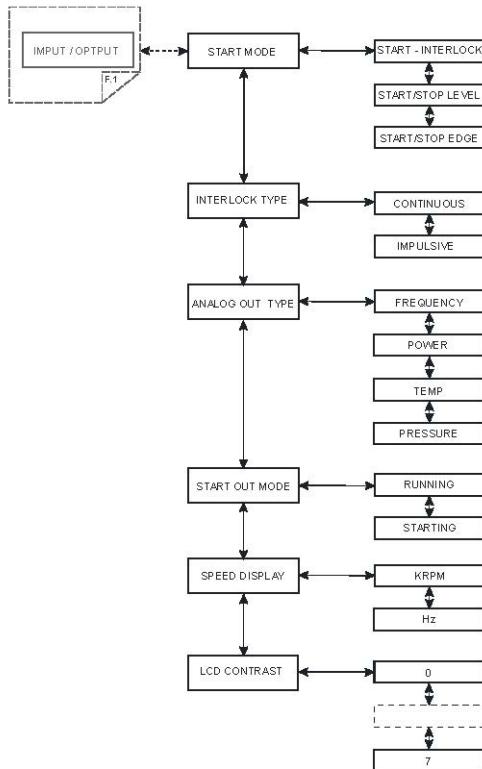
- **HIGH SPEED:** Sets (in Hz) the speed of rotation of the pump when the low-speed function is not active.
- **LOW SPEED:** Sets (in Hz) the speed of rotation of the pump when the low-speed function is active.
- **SOFT START:** enables (YES) or disables (NO) the soft start function. This parameter is visible only if the controller is configured in FRONT mode.
- **EXTERNAL FAN CNF:** Makes it possible to select driving mode of the external cooling fan. Possible options:
 - **ALWAYS ON:** the cooling fan is always ON
 - **SERIAL:** the cooling fan is controlled directly via the serial port.
- **VENT VALVE MODE:** makes it possible to select driving of the vent valve
 - **AUTO TIME:** the valve is controlled by the controller
 - **MANUAL:** the valve is controlled by the serial port.
 - **AUTO PUMP SPEED:** the valve is controlled by the controller, by taking into account the pump's deceleration.
- **VENT VALVE DELAY:** Sets the delay, expressed in seconds, between stopping of the pump and opening of the vent valve.
- **VENT VALVE OPEN TIME:** sets the time, expressed in seconds, of opening of the vent valve. Enter 0 if the valve is to be kept open indefinitely (until the next start).
- **LOAD GAS TYPE:** selects the type of gas used in the process. Therefore, the controller limits the power supplied to the pump according to the setting of this parameter, combined with the pump body temperature. Please always set up the LOAD GAS TYPE in accordance to the gas type used in the process. An improper selection of this setting could result in the damage of the pump.

Technical Information

- **RUN UP TIME:** it sets the maximum amount of time for which the pump is allowed to spin at a speed value less than the normal operating speed. The pump is not intended to spin for an indefinite time at a speed value lower than 700Hz; the Run Up Time value is selectable from 0 minutes to 30 minutes, default value is 15 minutes. If the pump, due to the gas flow applied to it, spins at a speed value less than 700Hz, the Run Up timer starts to count; when the counter value exceeds the Run Up Time set value, the pump will stop and the error condition "Run Up Time" will appear on the serial Win#206.
- **ACTIVE STOP:** enables (YES) or disables (NO) active braking.
- **STOP SPEED READING:** enables (YES) or disables (NO) the pump rotational frequency reading function also during the slowing phase that follows a stop command.

Input/Output Menu

This menu contains parameters that determine the operating mode of the inputs and outputs of the controller.



Flow 3/6

Figure 67

- **START MODE:** Permits selection of one of the three types of functioning of the START/STOP and INTERLOCK inputs:
 - **START/INTERLOCK:** The pump is started if the START/STOP input is activated and is stopped if the START/STOP input is de-activated. The interlock input must be constantly active (INTERLOCK TYPE parameter = continuous) or may be active only at the time of starting (INTERLOCK TYPE parameter = impulsive).

Technical Information

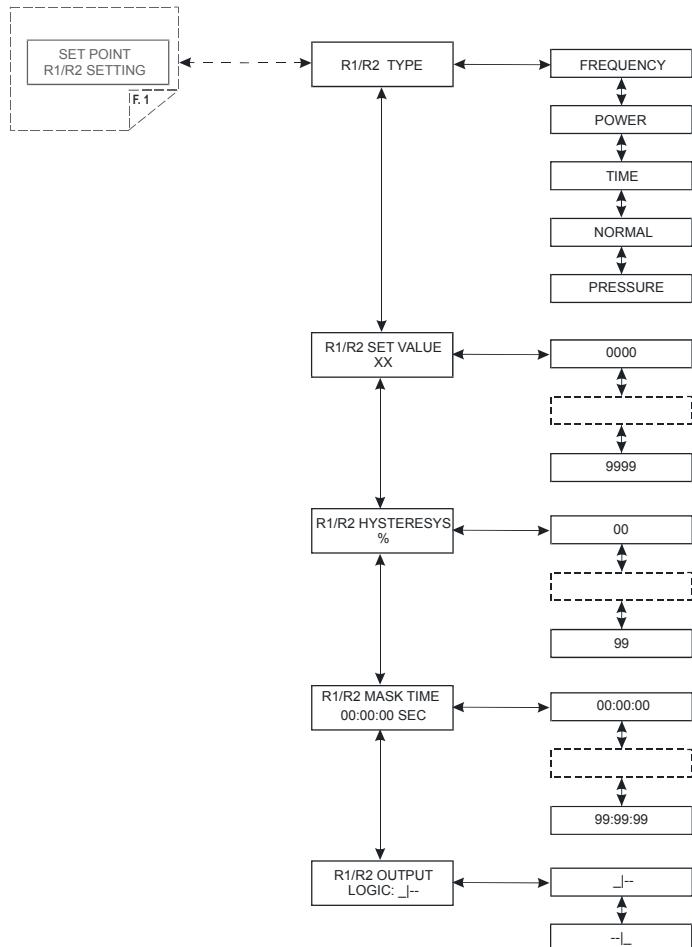
- START/STOP LEVEL The START/STOP input acts as only START command (active on the level) The INTERLOCK input acts as STOP command (active on the level).
In the case of concurrent activation of the two inputs, the STOP command takes priority.
- START/STOP EDGE The START/STOP input acts as START command (active on the edge).
The INTERLOCK input acts as STOP command (active on the edge).
- **INTERLOCK TYPE:** This parameter is displayed only when the previous parameter (START MODE) is equal to START/INTERLOCK and permits selection of one of the following two operating modes of the INTERLOCK input:
 - CONTINUOUS: the INTERLOCK input must be active continuously so that the pump can be driven by the controller. If, with the controller in start, the input INTERLOCK is de-activated, the controller switches to WAITING INTERLOCK status and interrupts driving of the pump.
 - IMPULSIVE: it is sufficient for the input to be active when the START command is sent to the pump. Subsequently, the input can also be de-activated. If the interlock is not active when the pump is started, the controller switches too WAITING INTERLOCK status.
- **ANALOG OUT TYPE:** permits selection of the type of signal to be sent to the programmable analogue output. One of the following signals can be selected:
 - FREQUENCY: the drive frequency of the pump is shown
 - POWER: the power supplied to the pump is shown
 - TEMPERATURE: the temperature of the pump is shown
 - PRESSURE: the pressure read by the gauge is shown.

Technical Information

- **START OUT MODE:** Selects the operating mode of the START output. Possible options:
 - RUNNING: the output is active when the pump is driven
 - STARTING: the output is active only during acceleration ramp-up.
- **SPEED OUT MODE (KRPM/Hz):** permits selection of the unit of measurement of the speed of rotation shown on the display of the controller.
This setting acts only on the measurement shown on the display.
Possible options:
 - KRPM
 - Hz
- **LCD CONTRAST**

Setpoint R1 and Setpoint R2 Submenus

This submenu contains the settings relating to the output with relay R1 and R2 (if it is connected a gauge it will present also the settings for the set point 3).



Flow 4/6

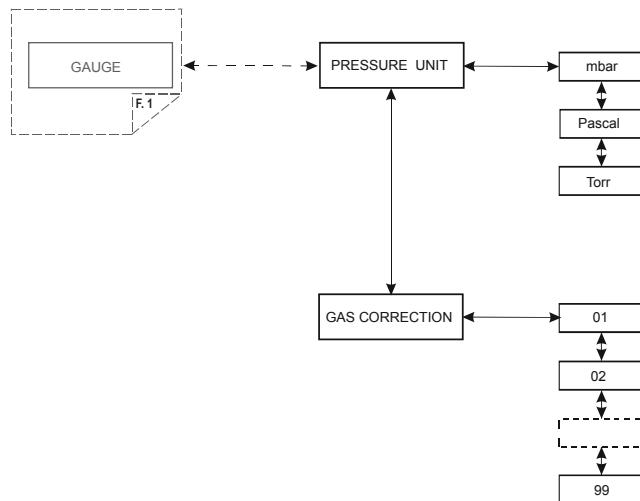
Figure 68

Technical Information

- **R1 (R2) TYPE:** selects the type of reference measurement to drive the relay.
Possible types:
 - Frequency: driving frequency of the pump
 - Power: power supplied to the pump
 - Time: time from start
 - Normal: achievement of normal condition
 - Pressure: pressure read by the gauge, if present
- **R1 (R2) SET VALUE:** Sets the reference value at which the relay R1 (R2) is activated. This parameter has no effect if NORMAL (previous parameter) is selected as SETPOINT TYPE.
- **R1 (R2) HISTERESYS:** Sets, in percentage, the hysteresis of the relay
- **R1 (R2) MASK TIME:** sets the masked time (in hh:mm:ss), measured from start, within which the SETPOINT R1 (R2) is not driven even if the threshold value has been reached. This parameter is not available if SETPOINT TYPE is set to NORMAL
- **R1 (R2) OUTPUT LOGIC:** Selects the control logic of the SETPOINT output.
 - positive logic (the relay is energized when the measurement exceeds the reference)
 - negative logic (the relay is energized when the measurement is below the reference).

Gauge Menu

This menu contains the parameters relating to functioning of the active gauge.



Flow 5/6

Figure 69

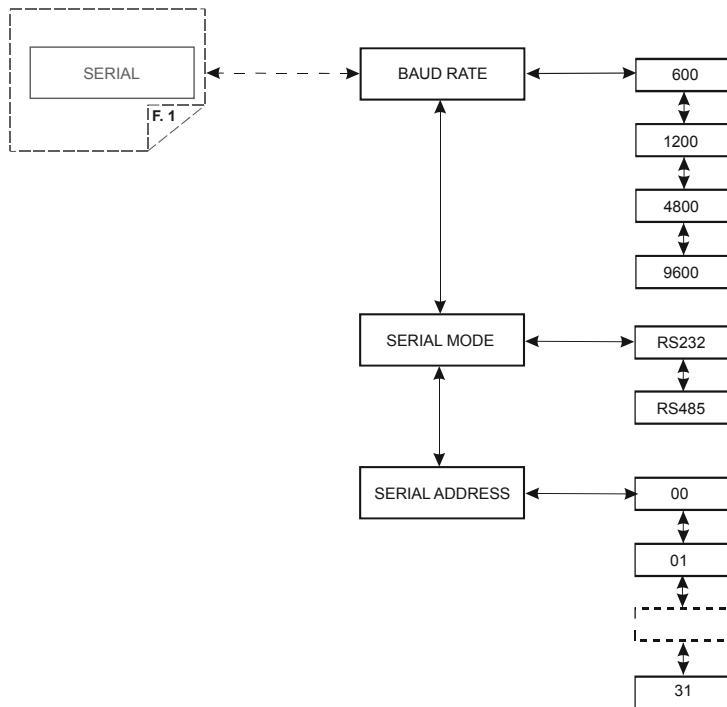
- **PRESSURE UNIT:** selects the unit of measurement of the pressure used to show this on the display, for display on the serial line and for setting of the setpoint and autopressure thresholds. Possible options:
 - mbar
 - Pascal
 - Torr
- **GAUGE MODEL ID:** it shows the gauge model identified by the controller. If there are more model with the same identification the user can select the right gauge connected

Technical Information

- **GAS TYPE** : sets the gas type:
0 : not configured
1 : Nitrogen
2 : Argon
3 : Hydrogen
4 : Other
- **CORRECTION** : if it is selected the gas type 4 (Other) you can set the correction factor of the pressure measurement for this kind of gas. The pressure indicated by the instrument is equal to:
 $P_{\text{indicated}} = P_{\text{measured}} \times \text{Gas correction} / 10$

Serial Menu

This menu contains the settings for management of the RS232/485 serial line.



Flow 6/6

Figure 70

- **BAUD RATE:** permits selection of the communication speed selecting this from 600, 1200, 4800, 9600 baud
- **SERIAL MODE:** permits setting of the type of interface to RS232 (point to point) or RS485 (multidrop)
- **SERIAL ADDRESS:** sets the address of the node in the case of the RS485 interface. This parameter is not visible if the RS232 is selected.

How to Use by Remote I/O

- 1** Power ON the controller
- 2** Press the “COUNTERS” and “MEASURES” button together.
- 3** Select MODE = REMOTE from the “INPUT/OUTPUT” menu
- 4** Exit from configuration menu
- 5** Connection example:

How to Use in Serial Mode

- 1** Power on the controller
- 2** Connect the serial cable
- 3** Select by front panel if you want to work in 232 or 485, and if necessary, the serial address.
- 4** Select SERIAL from the INPUT/OUTPUT menu
- 5** Open the A-Plus software (see orderable parts table)
- 6** Ready to operate by SERIAL connections.

Technical Information

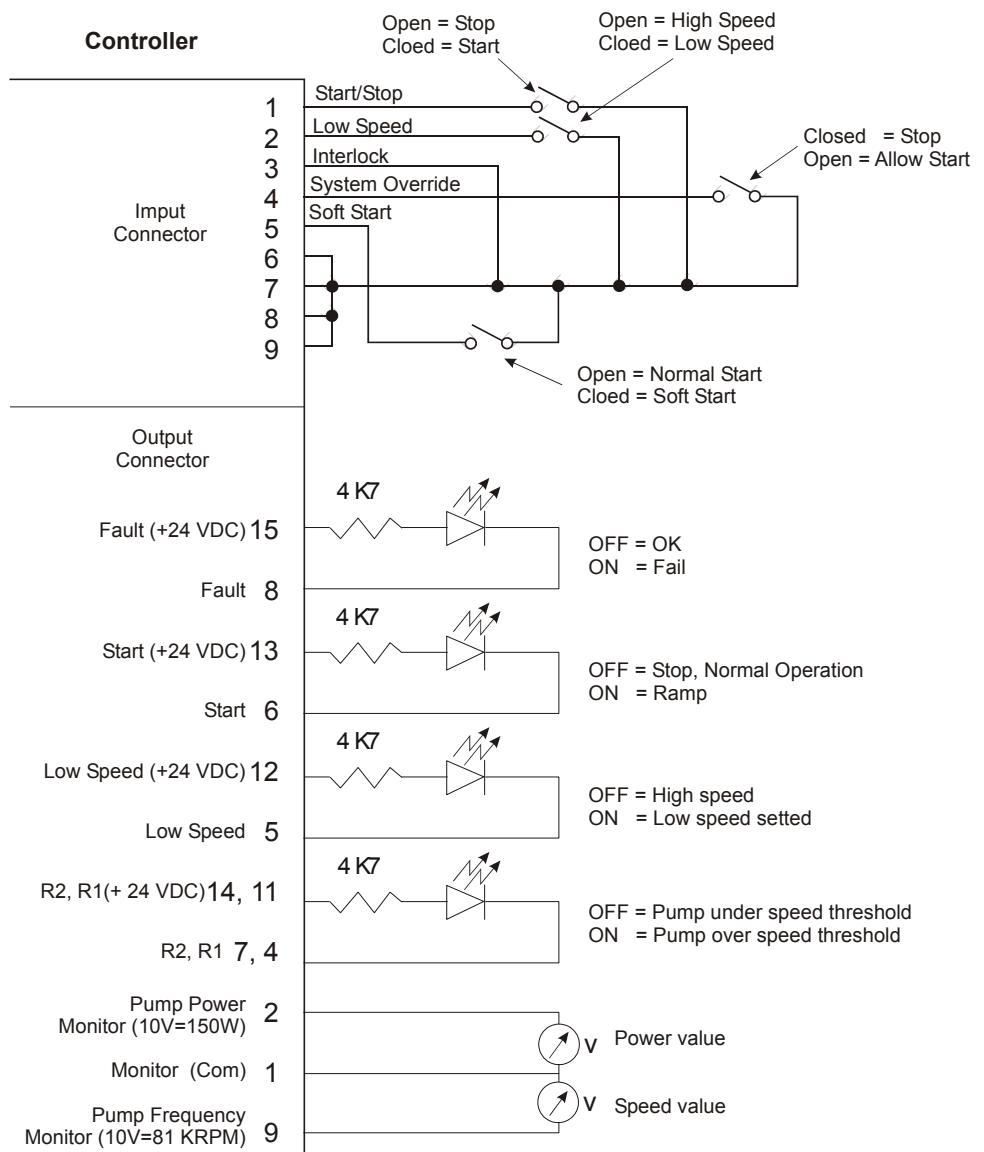


Figure 71

Profibus Option

General

The ProfiBus option allow to communicate with the controller as ProfiBus DP slave device.

The option works as a bi-directional bridge between the ProfiBus network and the Agilent turbo controller internal link. The interface provides input data (measures) and output data (commands) to the controller, and in addiction provides standard and user related diagnostics, in order to allow the user to manage the exceptions.

Installation

This option is factory installed.

The ProfiBus connector pin-out is reported in the following figure. Please in order to obtain best performance use ProfiBus certified cables.

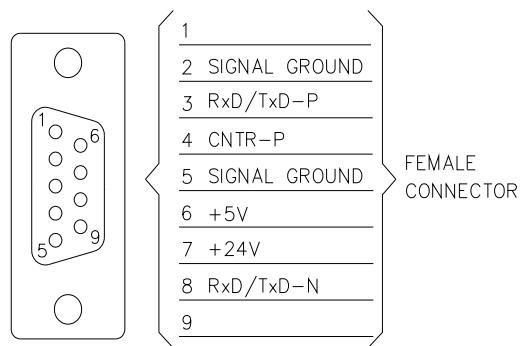


Figure 72 ProfiBus connector

Configuration

Before power-on the controller set the ProfiBus address by the 2 rotary switches.

Up to 126 different addresses (from 0 to 125) can be selected. The address value sets by the 2 switches is expressed in hexadecimal notation, so value from 00 to 7D are permitted; this setting is read by the interface during the power-on phase, so any change of the switch position after the power-on is ignored.

Software Operation and State Machine

From the software point of view, the interface can be seen as two devices (one for ProfiBus and the other for the internal link) linked together.

Each device has its own state machine to manage the device operation.

ProfiBus link state machine

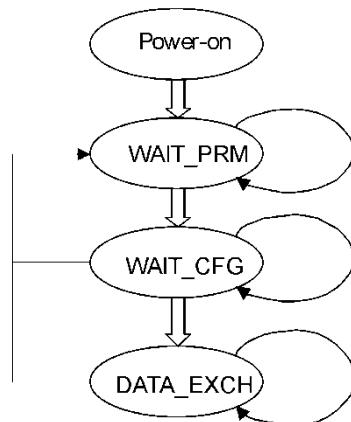


Figure 73

Technical Information

Table 24 Profibus state machine

Status	Meaning
POWER_ON	Interface set-up
WAIT_PRM	Wait for parameterisation from the master
WAIT_CFG	Wait for configuration from the master
DATA_EX	Regular data exchange

Internal link state machine

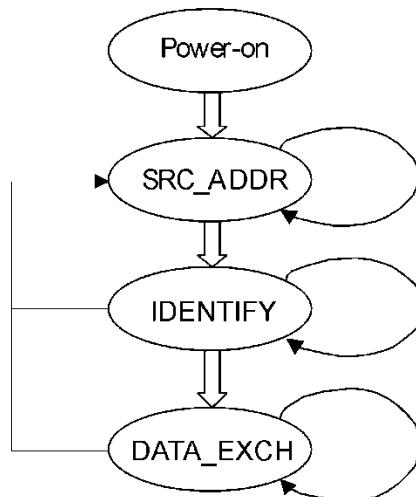


Figure 74

Table 25 Internal link state machine

Status	Meaning
POWER_ON	Interface set-up
SRC_ADDR	Search for the controller serial address
IDENTIFY	Identify controller model and protocol
DATA_EX	Regular data exchange

Technical Information

The two machines continuously share I/O data with the relative bus, and interact each other only in following conditions:

- ProfiBus Data Exchange is suspended (static diagnosis activated) if the internal serial link is not established
- Internal serial link Data Exchange is suspended (only for output data) if the ProfiBus State machine is not in Data Exchange mode

As a general rule, unrecoverable communication errors make each machine to jump to the state immediately following the power-on state (WAIT_PRM or SRC_ADDR).

Message Mapping

The communication is based on the continuous data exchange capability of the ProfiBus standard, where the master sends continuously the entire slave configuration and reads back the entire slave status. For this purpose one Input (from slave to master) and one Output (from master to slave) buffers are provided. All the needed parameters are mapped inside each buffer.

The following tables summarise the ProfiBus parameter access, related to the corresponding windows serial protocol (for this protocol please refers to the serial interface paragraph).

The interface doesn't any scaling operation on the read/written parameters. It acts only as a gateway between the ProfiBus network and the pump's controller serial interface. As a consequence of this, the scale and the meaning of some parameters depends directly to the specific model of Turbo Pump controller connected to the interface.

Parameter Buffer

Table 26 Parameter buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
0	1	-	0-99	Gauge gas load type. The value is divided by 10 (entering 12 the controller will apply 1.2) Enter here the correction factor for gas (necessary only if gauge is connected).	161
1	2	mA/Hz/sec	0-10000	Setpoint 1 value. Enter here the threshold value for the R1 output, valid only if B0-B2 of Parameter Buffer Offset-21 is equal to 0,1,2 or 3.	102
3	2	Sec	0-30000	Setpoint 1 Mask Time. Set here the time, measured from the start pump event, while the R1 output is masked (not activated)	103
5	2	mA/Hz/sec	0-10000	Setpoint 2 value. Enter here the threshold value for the R2 output, valid only if B3-B5 of Parameter Buffer Offset-21 is equal to 0,1,2 or 3.	172
7	2	Sec	0-30000	Setpoint 2 Mask Time. Set here the time, measured from the start pump event, while the R2 output is masked (not activated)	173
9	2	0.2sec/bit	0-30000	Vent Valve Opening Delay. Set the delay time between the stop command and vent opening. Valid only in "purge/vent auto mode" (Parameter Buffer, Offset 20, B0 = 0). 0 = infinite (the valve will never open).	126
11	2	0.2sec/bit	0-30000	Vent Valve Open Time. Set how long the vent will remain open, then both purge and vent will be closed. Valid only in "purge/vent auto mode" (Parameter Buffer, Offset 20, B0 = 0). 0 = infinite (the valve remain open till next start command).	147
13	1	%	1-99	Setpoint 1 Hysteresis. Set the Setpoint1 hysteresis around the nominal value	105
14	1	%	1-99	Setpoint 2 Hysteresis. Set the Setpoint2 hysteresis around the nominal value	175
15	1	mBar/Torr/Pa	0-99	Setpoint 1 Pressure Value Mantissa. Set the mantissa of the exponential value of the R1 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, B0-2 = 4). The value set here is divided by 10, that means 11 = 1.1	162
16	1		-10 - +10	Setpoint 1 Pressure Value Exponent. Set the exponent of the exponential value of the R1 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, B0-2 = 4).	162

Technical Information

Table 26 Parameter buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
17	1	mBar/Torr/Pa	0-99	Setpoint 2 Pressure Value Mantissa. Set the mantissa of the exponential value of the R2 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, B3-5 = 4). The value set here is divided by 10, that means 11 = 1.1	176
18	1		-10 - +10	Setpoint 2 Pressure Value Exponent. Set the exponent of the exponential value of the R2 setpoint (format X.XE-XX) when it is used for pressure monitoring (Parameter Buffer, Offset 21, B3-5 = 4).	176
19	1			B ₀ = Stop Speed Reading. This function measures the pump speed after a stop command. 0 = Off 1 = On	167
				B ₁ = Active Stop. This function brakes the pump after a stop command, by using the motor as a generator. 0 = Off 1 = On	107
				B ₂ - Reserved	
				B ₃₋₄ = Start/Stop/Interlock Mode. Change the logic of Start/Stop and Interlock inputs. Ask to Agilent personnel for this option	151
20	1			B ₀ = Vent & Purge Auto/Man 0 = Auto (the controller drives purge and vent valves automatically) 1 = Manual (the user can command the valves by serial line or profibus)	125
				B ₁ = Gas Load Type. Select here the gas load 0 = Ar 1 = N ₂	157
				B ₂ = Interlock Type 0 = continuos (the interlock must be always present to run the pump) 1 = at start (the interlock must be present only at start command)	110
				B ₃ = Setpoint R1 Logic 0 = active close (NO) 1 = active open (NC)	104

Technical Information

Table 26 Parameter buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
			B4 = Setpoint R2 Logic 0 = active close (NO) 1 = active open (NC)		174
			B ₅₋₆ = Pressure Unit 0 = mbar 1 = Pascal 2 = Torr		163
			B7 = Reserved		
21	1		B ₀₋₂ = Setpoint R1 Type 0 = frequency 1 = current 2 = time 3= normal operation 4= pressure		101
			B ₃₋₅ = Setpoint R2 Type 0 = frequency 1 = current 2 = time 3= normal operation 4= pressure		171
			B ₆₋₇ = Analog Output 1 Type 0 = frequency 1 = power 2 = temperature 3= pressure		111

Output Buffer

Table 27 Output buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
0	1		B ₇ = Start/Stop 0 = Stop, 1 = Start		000
			B ₆ = Low Speed This bit set the pump target speed to "low speed value" (Output Buffer, Offset 3), otherwise the target speed is set to "high speed value" (Output Buffer, Offset 1). 0 = Off, 1 = On		001
			B ₅ – Soft Start This bit activates the soft start function which run-up the pump smoothly. Please activate this function only if the pump has been stopped for at least 3 months. 0 = On, 1 = Off		100
			B ₄ = Vent Valve Command 0 = Close, 1 = Open Valid only if in Par Buff, Offset-20, B ₀ =1		122
			B ₃ = Purge Valve Command 0 = Close, 1 = Open Valid only if Par Buff, Offset-20, B ₀ =1		145
			B ₂ – Not used		
			B ₀₋₁ = Operating Mode These bits define from which source the controller has to get commands (readings are always available). In order to operate the controller by Profibus these bits must be set to 3. 0 = Remote I/O 1 = Serial 2 = Front panel 3 = Profibus		008
1	2	Hz	1100 - 1350	High Speed Value Set the high rotational speed value	120
3	2	Hz	1100 - 1350	Low Speed Value Set the low rotational speed value	117

Input Buffer

Table 28 Input buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
0	1	V	0-100	Voltage Voltage provided to the motor	201
1	1	°C	0-100	Pump Bearing Temperature Read the pump upper bearing temperature If > 60 °C the controller goes into fail status and the pump is stopped	204
2	1	°C	0-100	Controller Power Supply Temperature Read the controller power section temperature if > 75 °C the controller goes in fail status "controller over-temperature"	216
3	1	°C	0-100	Controller CPU Section Temperature Read the controller CPU section temperature if > 80 °C the controller goes in fail "controller overtemperature"	211
4	1	-	0-6	B ₀₋₃ – Status 0 = Stop 1= Waiting for interlock (interlock connections on remote I/O connector missing) 2 = Ramp (the pump is increasing the speed) 3 = Auto tuning (the speed has been reduced because the gas load is higher than the Power Limit Applied) 4 = Braking (the pump is reducing the speed using the motor) 5 = Normal operation (the pump is at target speed) 6 = Fail (see error code byte Input Buffer Byte-27)	205
5	1	-	-	Error Code (bit field)	206
				B ₇ – Too High Load (the gas load is too high for the pump)	
				B ₆ – Short Circuit (a short circuit happened between the two of the three motor phases)	
				B ₅ – Over Voltage (too high bus voltage during braking)	
				B ₄ – Verify Line Select Not used	
				B ₃ – Power Fail (internal circuitry failure)	
				B ₂ – Controller Over-Temperature ("Controller Power Section Temperature" or "Controller CPU Section Temperature" are over the limit)	
				B ₁ - Pump Over-Temperature ("Pump Bearing Temperature" or "Pump Body Temperature" are over the limit)	

Technical Information

Table 28 Input buffer

Offset Byte	Size Byte	Unit Res	Range	Description	Win Serial
				B ₀ – Check Connection to Pump (the connection between controller and pump missing)	
6	1	-	-	B ₀ – Set Point R1 Status 0 = open 1 = closed	221
				B ₁ – Set Point R2 Status 0 = open 1 = closed	225
				B ₂ – Vent Valve Status 0 = closed 1 = open	122
				B ₃ – Purge Valve Status 0 = close 1 = open	145
				B4 – Not Used	
				B5 – Not Used	
				B6 – Not Used	
				B7 – Not Used	
7	2	mA	0-10000	Current Motor current consumption	200
9	2	W	0-200	Power Motor power adsorption	202
11	2	W	0-200	Power Limit Applied Maximum allowable power	155
13	2	Hz	0-1500	Driving Frequency Read the rotational speed of the pump	203
15	2	Hz	0-1500	Target Frequency Read the target rotational speed	120
17	2	-	0-65536	Cycle Number Number of cycles (start and stop) done by the pump	301
19	2	min	0-65536	Last Cycle Time How long the last cycle lasted	300
21	2	h	0-65536	Pump Life Total pump running time	302
23	4	mBar/ Torr/Pa	-	Pressure Reading Reports the pressure reading in the "pressure unit" selected by Par. Buff., Offset-20, B5-6	224

Diagnostic Management

In addition to the ProfiBus six byte standard diagnostic, the interface provides both user diagnostic and static diagnostics functions.

The standard diagnostic management is fully compliant with the ProfiBus specification.

During the start-up phase after power on, the first byte in the user diagnostic area, can assume values different from zero.

This byte has the following meaning:

- Bit 0 = 1: controller not responds (RS485 link broken)
- Bit 1 = 1: controller not identified (not compatible with the ProfiBus gateway)
- Bit 2 = 1: first loop of requests not ended (values in the input data are not fully coherent yet)

So, if the first byte is equal to 0, the interface is working properly, otherwise there is a problem.

Each nibble in the bytes following the interface status byte represents the status of the last attempt to write a parameter with following coding (diag status byte):

- | | |
|---|---|
| 0 | Write success |
| 1 | Controller response was "NACK" |
| 2 | Controller response was "Unknown window" |
| 3 | Controller response was "Bad Data Type" |
| 4 | Controller response was "Over range" |
| 5 | Controller response was "Bad operation" |
| 6 | Controller response was an unknown response |
| F | Parameter not supported by the controller |

The ProfiBus external diagnosis services are used to report following unexpected situations:

- **Controller fail:** if the controller goes in fail mode, an external diagnostic service is required and one byte in the diagnostic buffer signals the type of failure.
- **User parameter mismatch:** if the user sets one or more parameters out of their allowed range, a ProfiBus external diagnostic service is required and some bits in the diagnosis frame signals which parameter is wrong (i.e. over range or under range).

Diagnostic Buffer

Table 29 Diagnostic buffer

Off Set	Meaning	
0	B ₀ station non exist (set by master) B ₁ station not ready (slave not ready for data exchange) B ₂ cfg fault (configuration data doesn't match) B ₃ ext diag (slave has external diagnostic data) B ₄ not supported (slave doesn't support requested function) B ₅ invalid slave response (slave sets permanent '0') B ₆ prm fault (wrong parameter assignment) B ₇ master_lock (slave is parameterised by another master)	
1	B ₀ prm req (slave has to be re-parameterised) B ₁ stat diag (static diagnosis) B ₂ fixed '1' B ₃ wd_on (response monitoring active) B ₄ Freeze mode (received freeze command) B ₅ Synch mode (received synch command) B ₆ reserved B ₇ diag deactivated (slave is parameterised by another master)	Standard diagnostic
2	Reserved	
3	Master Add (master address after parameterisation. FF= without parameter)	
4	Ident number high	
5	Ident number low	
6	External diagnosis "Header" length indication including header	
7	Interface Status B ₀ Controller not responds B ₁ Controller not identified B ₂ Input data not fully coherent yet B ₃ Not used B ₄₋₇ Not used	External diagnostic
8	B ₇₋₄ – Start/Stop diag status B ₃₋₀ – Low Speed diag status	
9	B ₇₋₄ – Soft Start diag status B ₃₋₀ – Vent Valve	
10	B ₇₋₄ – Purge Valve B ₃₋₀ – Mode	
11	B ₇₋₄ – High speed B ₃₋₀ – Low Speed	

Error Messages

For a certain type of failure, the controller will self-diagnose the error and the following messages will be displayed.

NOTE

If the pump is not connected, the display will be as shown in the following figure.

C	H	E	C	K		C	O	N	N	E	C	T	I	O	N
			T	O		P	U	M	P						

Check connection between controller and pump, then press STOP push-button twice to start the pump.

NOTE

If the P1 input connector is not in position with the link or the external interlock connections are open, when the START pushbutton is pressed the display will be as shown in the following figure.

						W	A	I	T	I	N	G			
					I	N	T	E	R	L	O	C	K		

Disconnect connector P1 and check the link or the external interlock, then install the connector to start the pump.

NOTE

If within each step of the soft start mode the rotational speed of the pump do not reach the planned value within 15 minutes the display will be as shown in the following figure.

Technical Information

		R	U	N		U	P		T	I	M	E			

Adjust the process gas flow as appropriate in order to allow the pump to always spin at a speed value greater than 700Hz.

NOTE

Run Up Time is the maximum amount of time for which the pump is allowed to spin at a speed value less than the normal operating speed.

The pump is not intended to spin for an indefinite time at a speed value lower than 700Hz. If the pump, due to the gas flow applied to it, spins at a speed value less than 700Hz, the Run Up timer starts to count; when the counter value exceeds the Run Up Time set value, the pump will stop and the error condition "Run Up Time" will appear on the display.

NOTE

If in normal operation (after the starting phase) the current drawn by the pump is higher than programmed (1.8 A), the pump and the inter-connected devices are switched off and the display will be as shown in the following figure.

	T	O	O		H	I	G	H		L	O	A	D		

Verify that systems has no leaks than press STOP RESET pushbutton twice to start the pump.

Check that pump rotor is free to rotate then press the STOP RESET pushbutton twice to start the pump.

NOTE

If the upper bearing/pump temperature exceeds 60 °C, the pump is shut off, and the display will be as shown in the following figure.

						P	U	M	P						
				O	V	E	R	T	E	M	P				

The message will stay on until the temperature decreases below threshold value. Press the STOP RESET pushbutton twice to start the pump.

Technical Information

NOTE

If the controller transformer temperature exceeds 90°C, the pump is shut off, and the display will be as shown in the following figure.

			C	O	N	T	R	O	L	L	E	R			
			O	V	E	R	T	E	M	P					

NOTE

If the pump is stopped by an emergency stop signal provided via a remote contact, the display will be as shown in the following figure.

				S	Y	S	T	E	M						
			O	V	E	R	R	I	D	E					

Remove the controller power cable and check the emergency condition.

Then reconnect the power cable and press the START pushbutton to start the pump.

		O	V	E	R	V	O	L	T	A	G	E			

Controller power supply circuitry is faulty, or the Controller received a spike.

Press the START push-button twice to start the pump. Should the message still be present, call the Agilent service.

	S	H	O	R	T		C	I	R	C	U	I	T		

Check connections and shortages between pump and controller, then press the STOP RESET pushbutton twice to start the pump.

Accessories and Spare Parts

Table 30 Accessories and spare parts

Description	Part Number
Air Cooling Kit (0.5 m cable)	X3500-68011
Air Cooling Kit extention cable (5 m)	9699940
Vent Valve N.O. 0,5 mm orifice (0,5 m cable)	9699844
Vent Valve extention cable (5 m)	9699941
Mains cable NEMA plug (3 m)	9699958
Mains cable european plug (3 m)	9699957
RS232 Serial to B/T Adapter	X3514-68003
Serial cable for A-Plus software	9699883
Active Gauges	Ask Agilent for details

NOTE

The communication S/W between the controller and the pump (A-Plus) is available on the Agilent website:

<https://www.agilent.com/en/products/vacuum-technologies/vacuum-leak-detection-software/a-plus-software>

The connection is provided through USB (use a standard USB A male - USB B male).



Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

A handwritten signature in black ink, appearing to read "Giampaolo Levi".

Giampaolo LEVI

*Vice President and General Manager
Agilent Vacuum Products Division*

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE FAX

N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.Illi Varian, 54 – 10040 Leini (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

NAME	COMPANY	FUNCTION
ADDRESS:		
TEL. N° :	FAX N° :	
E-MAIL:		
PROBLEM / SUGGESTION :		
REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):		
		DATE
CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD)		LOG N°

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)





Vacuum Products Division
Instructions for returning products

Dear Customer,

Please follow these instructions whenever one of our products needs to be returned.

Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to include the completed **Health and Safety** declaration Section. No work can be started on your unit until we receive a completed copy of this form.

After evaluating the information, Agilent Technologies will provide you with a **Return Authorization (RA)** number via email or fax, as requested. Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

Product preparation

- Remove all accessories from the core product (e.g. inlet screens, vent valves).
- Prior to shipment and if applicable for your product, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
- If ordering an Advance Exchange product, please use the packaging from the Advance Exchange to return the defective product.
- Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
- Include a copy of the Health and Safety Declaration in the shipping documentation on the outside of the shipping box of your returning product.
- Clearly label package with RA number. Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.
- Return only products for which the RA was issued.

Shipping

- Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information. Customer is responsible for freight charges on returning product.
- Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, ADR, etc.) and carrier requirements.

RETURN THE COMPLETED REQUEST FOR RETURN FORM TO YOUR NEAREST LOCATION:

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Toll Free: 00 800 234 234 00
vpt-customercare@agilent.com

NORTH AMERICA:

Fax: 1 781 860 9252
Toll Free: 800 882 7426
vpl-ra@agilent.com

PACIFIC RIM:

please visit our website for individual office information
<http://www.agilent.com>



Vacuum Products Division
Terms and conditions

TERMS AND CONDITIONS

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Unless otherwise pre-negotiated, customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Agilent Technologies is not responsible for returning customer provided packaging or containers.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- Products returned that have not been drained from oil will be disposed.
- A Special Cleaning fee will apply to all exposed products
- If requesting a calibration service, units must be functionally capable of being calibrated.



Customer information			
Company :	Contact Name:		
Address:	Tel:	Fax:	
	Email:		
Equipment			
Product description	Agilent PartNo	Agilent Serial No	Original Purchasing Reference
Failure description	Type of process (for which the equipment was used)		
Type of return			
<input type="checkbox"/> Non Billable <input type="checkbox"/> Billable → New PO # (hard copy must be submitted with this form): _____ <input type="checkbox"/> Exchange <input type="checkbox"/> Repair <input type="checkbox"/> Upgrade <input type="checkbox"/> Consignment/Demo <input type="checkbox"/> Calibration <input type="checkbox"/> Evaluation <input type="checkbox"/> Return for Credit			
Health and safety		Substances (please refer to MSDS forms)	
The product has been exposed to the following substances: (by selecting 'YES' you MUST complete the table to the right)		<small>* Agilent will not accept delivery of any product that is exposed to radioactive, biological, explosive substances or dioxins. PCB's without written evidence of decontamination.</small>	
Trade name	Chemical name	Chemical Symbol	CAS Number
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Harmful	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Corrosive	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Reactive	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Flammable	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Explosive (*)	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Radioactive (*)	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Biological (*)	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Oxidizing	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Sensitizer	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Other dangerous substances	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Goods preparation			
If you have replied YES to one of the above questions. Has the product been purged?		<input type="checkbox"/> YES <input type="checkbox"/> NO	
If yes, which cleaning agent/method:			
Has the product been drained from oil?		<input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE	
I confirm to place this declaration on the outside of the shipping box.		<input type="checkbox"/>	
<p style="text-align: center;">I declare that the above information is true and complete to the best of my knowledge and belief.</p> <p style="text-align: center;">I understand and agree to the terms and conditions on page 2 of this document.</p>			
Name:	Authorized Signature:		
Position:			
Date:			
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In This Book

The manual describes the following:

- Istruzioni per l'uso
- Bedienungshandbuch
- Notice de mode d'emploi
- Manual de instrucciones
- 用户手册
- ユーザーマニュアル
- Instruction for Use
- Technical information

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